

1990

# Learning styles and barriers to learning perceived by adult students on campus

Jane C. Mertesdorf  
*Iowa State University*

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**Mertesdorf, Jane C., Ph.D.**

**Iowa State University, 1990**

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**300 N. Zeeb Rd.  
Ann Arbor, MI 48106**



**Learning styles and barriers to  
learning perceived by adult students on campus**

**by**

**Jane C. Mertesdorf**

**A Dissertation Submitted to the  
Graduate Faculty in Partial Fulfillment of the  
Requirement for the Degree of  
DOCTOR OF PHILOSOPHY**

**Department: Professional Studies in Education  
Major: Education (Adult and Extension Education)**

**Approved:**

Signature was redacted for privacy.

**In Charge of Major Work**

Signature was redacted for privacy.

**For the Major Department**

Signature was redacted for privacy.

**For the Graduate College**

**Members of the Committee:**

Signature was redacted for privacy.

**Iowa State University  
Ames, Iowa  
1990**

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## TABLE OF CONTENTS

	Page
<b>CHAPTER I. INTRODUCTION</b>	<b>1</b>
Background of the Study	1
Statement of the Problem	3
Research Questions	3
Assumptions	4
Definition of Terms	4
Conjectures and Research Questions	6
Subjects	7
Sampling Procedures	7
Data Gathering	7
Data Analysis	8
Limitations of the Study	8
Significance of the Study	9
<b>CHAPTER II. LITERATURE REVIEW</b>	<b>10</b>
Introduction	10
Differences Between Adult and Traditional-age Students	11
Barriers to Learning	13
Dispositional Barriers	20
Problems Identifying Dispositional Barriers	21
Adult Development	23
Learning Styles	30
Theoretical Framework of the Study	34
Kolb's Learning Style Inventory	37
Research on Kolb's Learning Style Inventory	39



	<b>Page</b>
<b>Conclusion</b>	<b>44</b>
<b>CHAPTER III. METHODOLOGY</b>	<b>47</b>
<b>Introduction</b>	<b>47</b>
<b>Setting of the Study</b>	<b>47</b>
<b>Universe of Study</b>	<b>48</b>
<b>Research Instrument</b>	<b>48</b>
<b>Barriers to Learning Index</b>	<b>49</b>
<b>Kolb's Learning Style Inventory</b>	<b>52</b>
<b>Demographic Items</b>	<b>61</b>
<b>Sampling Plan</b>	<b>61</b>
<b>Data Gathering Procedures</b>	<b>62</b>
<b>Subjects</b>	<b>63</b>
<b>Statistical Analysis of Findings</b>	<b>63</b>
<b>CHAPTER IV. ANALYSIS OF THE FINDINGS</b>	<b>65</b>
<b>Introduction</b>	<b>65</b>
<b>The Measurements</b>	<b>65</b>
<b>Barriers to Learning Index</b>	<b>65</b>
<b>The Learning Style Inventory</b>	<b>67</b>
<b>Hypothesis 1</b>	<b>70</b>
<b>Hypothesis 2</b>	<b>70</b>
<b>Hypothesis 3</b>	<b>72</b>
<b>Hypothesis 4</b>	<b>74</b>
<b>Hypothesis 5</b>	<b>75</b>
<b>Hypothesis 6</b>	<b>76</b>
<b>Additional Analyses</b>	<b>77</b>

	<b>Page</b>
<b>Barriers to Learning</b>	<b>77</b>
<b>Learning Style Types and Demographic Variables</b>	<b>85</b>
<b>CHAPTER V. SUMMARY, DISCUSSION, IMPLICATIONS, RECOMMENDATIONS, AND CONCLUSIONS</b>	<b>91</b>
<b>Introduction</b>	<b>91</b>
<b>Summary of the Study</b>	<b>91</b>
<b>Discussion of the Findings</b>	<b>92</b>
<b>Implications for Kolb's Theory of Experiential Learning</b>	<b>102</b>
<b>Implications for Higher Education</b>	<b>104</b>
<b>Future Research</b>	<b>105</b>
<b>Conclusions</b>	<b>107</b>
<b>BIBLIOGRAPHY</b>	<b>109</b>
<b>ACKNOWLEDGEMENTS</b>	<b>117</b>
<b>APPENDIX A. HUMAN SUBJECTS APPROVAL</b>	<b>119</b>
<b>APPENDIX B. DEMOGRAPHIC DATA OF SUBJECTS</b>	<b>122</b>
<b>APPENDIX C. COVER LETTER ACCOMPANYING THE QUESTIONNAIRE</b>	<b>127</b>
<b>APPENDIX D. QUESTIONNAIRE</b>	<b>129</b>
<b>APPENDIX E. BARRIERS TO LEARNING BY DIMENSIONS</b>	<b>134</b>
<b>APPENDIX F. VALIDITY AND RELIABILITY OF KOLB'S LSI</b>	<b>137</b>

## LIST OF TABLES

	Page
Table 1. Perceived Barriers to Learning by Categories	20
Table 2. Standard Deviation Intervals for Levels of Learning Style Dominance	60
Table 3. Items for Barriers to Learning with Highest and Lowest Mean Scores and their Dimensions	66
Table 4. Barriers to Learning Index Mean Scores	67
Table 5. Means and Standard Deviations for Learning Modes and Combination Scores on the Learning Style Inventory	67
Table 6. Frequency and Percent for Learning Style Preference Categories	68
Table 7. Frequency and Percent of the Five Levels of Learning Style Dominance	68
Table 8. Mean Scores for the Learning Style Dominance by Barrier Dimensions	69
Table 9. Summary of t-test for Barrier Dimension Mean Scores	70
Table 10. Summary of Mean Scores and F-ratios for Grouped Classification by Barrier Dimensions	71
Table 11. Summary of Mean Scores and F-ratios for Classification by Barrier Dimensions	72
Table 12. Pearson Correlation Coefficients for Barrier Dimension Scores with Age	73
Table 13. Summary of Mean Scores and F-ratios for Age Groups and Barrier Dimension Scores	73
Table 14. Summary of t-test for Dominant Learning Styles by Barrier Dimensions	74
Table 15. Summary of t-test for Balanced and Dominant Level Learning Styles by Barrier Dimensions	75

	Page
Table 16. Summary of Chi-square for Levels of Dominance by Classification	76
Table 17. Pearson Correlation Between Barrier Dimensions and Elapsed Time Since Last Attending a College	77
Table 18. Summary of Mean Scores and F-ratios for Single and Married Status by Barrier Dimensions	78
Table 19. Summary of Mean Scores and F-ratios for Marital Status by Barrier Dimensions	79
Table 20. Summary of Mean Scores and F-ratios for College of their Major by Barrier Dimensions	80
Table 21. Summary of Mean Scores and F-ratios for Full-time and Part-time Student Status by Barrier Dimensions	81
Table 22. Summary of Mean Scores and F-ratios for Employed and Not Employed by Barrier Dimensions	82
Table 23. Summary of Mean Scores and F-ratios for Children Living at Home by Barrier Dimensions	84
Table 24. Summary of Mean Scores and F-ratios for Travel Distance by Barrier Dimensions	84
Table 25. Summary of Chi-square for Learning Style Types by Gender	86
Table 26. Summary of Chi-square for Learning Style Types by College of Their Major	87
Table 27. Summary of Chi-square for Learning Style Types By Classification	88
Table 28. Summary of Chi-square for Learning Style Types by Age	89
Table 29. Summary of Mean Scores and F-ratios for Learning Style Types By Barrier Dimensions	89
Table 30. Frequency of Gender	123
Table 31. Frequency of Age	123

	<b>Page</b>
<b>Table 32. Frequency of Marital Status</b>	<b>123</b>
<b>Table 33. Frequency of Children Living at Home</b>	<b>124</b>
<b>Table 34. Frequency of Employment Status</b>	<b>124</b>
<b>Table 35. Frequency of Miles to Campus</b>	<b>124</b>
<b>Table 36. Frequency of Classification</b>	<b>125</b>
<b>Table 37. Frequency of Credit Hours</b>	<b>125</b>
<b>Table 38. Frequency of Major by College</b>	<b>125</b>
<b>Table 39. Frequency of Time of Day Attended Classes</b>	<b>126</b>
<b>Table 40. Frequency of Previously Attended a College</b>	<b>126</b>
<b>Table 41. Correlations Between Learning Style Inventory Scores and Personality Tests</b>	<b>137</b>
<b>Table 42. Kolb's Reliability of the 1985 LSI (n=268)</b>	<b>138</b>
<b>Table 43. Kolb's Correlation Between Current and Old LSI (n=268)</b>	<b>139</b>
<b>Table 44. Kolb's Pearson Correlations among LSI 1985 Scales (N=1,446)</b>	<b>140</b>

**LIST OF FIGURES**

	<b>Page</b>
<b>Figure 1. The Experiential Learning Theory of Growth and Development</b>	<b>35</b>
<b>Figure 2. The Experiential Learning Model</b>	<b>36</b>
<b>Figure 3. Learning Modes, Descriptions, and Emphasis</b>	<b>37</b>
<b>Figure 4. Kolb's Model of Experiential Learning</b>	<b>38</b>
<b>Figure 5. Scree Plot for LSI Factor Analysis</b>	<b>56</b>

## **CHAPTER I.**

### **INTRODUCTION**

#### **Background of the Study**

Higher education has an important task in accommodating the increasing numbers of adult students. These students enter institutions of higher education having extensive and varied life and work experiences from which to draw. Assuming that adult students are entering institutions that have typically planned programs and curricula for traditional-aged students, the adult student will have some different learning needs and goals from those of traditional-aged students.

Most adult students have had extensive exposure to adult roles and responsibilities with their jobs, families, and communities. Their need for further learning has been "triggered" by events or circumstances in their professional or personal lives. Aslanian and Brickell (1980) reported that 83% of adult learners identified past, present, or future transitions in their lives as the motivating factor that caused them to renew learning. Whether the transitions are good or bad, they pervade students' lives.

These transitions require adult students to cope with and adjust to the trigger event(s), cope with the adjustment to college life, and juggle many obligations and responsibilities. These disruptive factors create obstacles for adult students as they pursue their educational needs and goals.

These obstacles have been categorized into three types of barriers (Cross, 1978 and 1986). Institutional barriers are created by institutional practices and policies, situational barriers are generated by adult students' life circumstances, and dispositional

barriers are created by psychological struggles with attitudes and self-perceptions about oneself as a learner.

Literature on barriers to learning reports that respondents most frequently refer to institutional or situational barriers as more formidable than dispositional barriers. Merriam (1984) proposed that dispositional barriers are probably more powerful barriers than either institutional or situational barriers since they reflect past negative experiences with education. Cross (1986) believes the "real" importance of dispositional barriers is underestimated since theoretically based inquiry is lacking for studies on barriers to learning.

A theoretical framework which aids the understanding and significance of dispositional barriers must be sensitive to the developmental perspective on the process of growth, change, and transition of adult students. Kolb's (1984) theory of growth and development is particularly useful in understanding adult students' growth and development relative to learning.

Kolb proposes that different learning abilities are required of learners: concrete experience (CE) abilities, reflective observation (RO) abilities, abstract conceptualization (AC) abilities, and active experimentation (AE) abilities. According to Kolb (1976) "the learner, if he is to be effective, needs four different kinds of abilities . . . yet this ideal is difficult to achieve" (p. 3). The human growth process described by Kolb (1984) is in three stages: a) acquisition (birth to adolescence) of basic learning abilities and structures, b) specialization (adolescence through mid-career) with competence in specialized abilities to master particular life tasks, and c) integration (mid-career throughout life), a period of reassertion of non-dominant learning abilities and the



expression of new goals and interests. The peak of learning maturity is achieved as the four growth dimensions converge at the highest stage of development: integration.

Kolb (1984) believes that the transition from the specialization to the integration stage of development is difficult to accomplish because of the specialization function which society rewards. Conflict between social demands and personal fulfillment needs precipitates the student's transition into the integration stage of development. Some adult students may gradually experience the transition, others may experience a life crisis with a dramatic transition, while still others may never experience the transition into the integration stage of development.

#### **Statement of the Problem**

Adult students in higher education are faced with problems in adapting to their educational environment. Effective adaptation seems likely to have a positive effect on their success in achieving the full potential of their educational pursuits, whereas ineffective adaptation likely will have a negative impact. The purpose of this study was to explore the relationship between the four adaptive learning modes and the problems adult students experience as they attempt to adapt to their educational environment.

#### **Research Questions**

1. What types of barriers (dispositional, institutional, and situational) do adult students perceive to be most difficult?
2. Do adult students of different ages and years in college have different types of barriers?
3. Is there a relationship between dominant learning modes and perceived barriers to learning?

4. Are some barriers more difficult for adult students who have dominant learning modes?
5. Are dispositional barriers more difficult for adult students with dominant learning modes than for those with balanced learning modes?
6. Is there a relationship between the dominance of learning modes and year in college?

### **Assumptions**

1. Institutions of higher education more commonly focus curriculum, programs, and missions on traditional-age students than on adult students.
2. Adult students have educational goals and developmental needs as they enter institutions of higher education and pursue their educational goals.
3. Adult students experience all types of barriers (dispositional, institutional, and situational) as they pursue their educational goals and needs.
4. Skills and abilities in four modes of learning are needed to cope with and adapt most effectively to the complex and multifaceted educational environment, as suggested by Kolb's learning style theory.

### **Definition of Terms**

**Adult student:** For the purposes of this study, any undergraduate student 25 years of age or older engaged in a program of study either full- or part-time.

**Barriers to learning:** Perceived factors that are disruptive for adult students as they pursue their educational needs and goals. These are dispositional, institutional, and situational, as defined below.

**Dispositional barriers** are psychological perceptions about oneself as a learner which cause difficulties for a student in adapting to the educational environment.

**Institutional barriers** include practices and policies of institutions of higher education that discourage or inhibit adult students in their educational pursuits.

**Situational barriers** are limitations in adult students' educational pursuits brought about through situations related to one's job, family, age, or economic circumstances.

**Learning modes:** The ways individuals uniquely process information, including concrete experience (feeling), reflective observation (watching), abstract conceptualization (thinking), and active experimentation (doing) (Kolb, 1976).

**Learning style:** Various combinations of learning modes make up the individual's characteristic means of perceiving and processing information (Kolb, 1976). These are diverger, assimilator, converger, and accommodator, as explained below.

**Diverger** is dominant in the areas of concrete experience and reflective observation. These students are strong in imaginative ability and in viewing concrete situations from many perspectives. Other strengths include investigating new patterns, recognizing problems, and generating alternatives.

**Assimilator** is dominant in the areas of abstract conceptualization and active experimentation. These students' greatest strengths lie in creating theoretical models. The concern for abstract concept formation is stronger

than the concern for the way theories are applied.

Converger is dominant in abstract conceptualization and active experimentation. These students do best in situations where there is a single correct answer to a question or problem.

Accommodator is dominant in concrete experience and active experimentation. These students excel in situations that demand adaptation to specific circumstances.

### **Conjectures and Research Questions**

This study provided data on perceived barriers to learning and learning modes of undergraduate adult students in higher education to test the following research hypotheses.

#### **Conjecture I**

If adult students perceive that their educational goals and needs are not congruent with those of the institution of higher education, they will experience difficulties in their educational pursuits.

Hypothesis 1: The dispositional barrier scores will be statistically higher ( $p < .05$ ) than either institutional or situational barrier scores.

Hypothesis 2: All three barrier dimension scores will be statistically higher ( $p < .05$ ) for freshmen and sophomores than for juniors and seniors.

Hypothesis 3: All three barrier dimension scores will be statistically higher ( $p < .05$ ) for younger adult students than for older adult students.

#### **Conjecture II**

If adult students have balanced learning styles, they will be better able to adapt to

the learning environment.

Hypothesis 4: Students with dominant learning modes will have higher ( $p < .05$ ) dispositional barrier scores than either situational or institutional barrier scores.

Hypothesis 5: Students with balanced learning modes will have lower ( $p < .05$ ) dispositional barrier scores than will students with dominant learning modes.

Hypothesis 6: Proportionately more ( $p < .05$ ) junior and senior students will have balanced learning modes scores than will freshmen and sophomore students.

### **Subjects**

The study surveyed a random sampling of 860 of the 1549 University of Northern Iowa (UNI) undergraduate students who were 25 years of age or older during spring 1989. The study examined the relationship between perceived barriers to learning and learning preference of undergraduate adult students.

### **Sampling Procedures**

The sample consisted of 860 subjects selected using a systematic random sample plan from UNI's Registrar's list of undergraduate students 25 years of age or older. Questionnaires were mailed to the random sample, with 436 questionnaires returned, a rate of 51%. A final sample of 431 was included for analysis in this study.

### **Data Gathering**

Adult students' learning modes were assessed using the Learning Style Inventory (LSI) developed by David Kolb in 1976 and revised in 1985. The LSI (1985) reflects the relative emphasis on each of four learning modes: concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation

(AE). The learning mode scores are also used to classify learners into one of four learning styles: diverger, assimilator, converger, or accommodator.

Barriers were assessed using a questionnaire developed by the researcher. The questionnaire was based on Cross' (1986) categories for barriers to learning: dispositional, institutional, and situational.

### **Data Analysis**

To test hypotheses 1, 4, and 5, the t-test for paired observations was used. To test hypotheses 2 and 3 a one-way analysis of variance (ANOVA) was used. To test hypothesis 6 chi-square was used.

### **Limitations of the Study**

This study was limited to adult students enrolled in four-year undergraduate degree programs at the University of Northern Iowa (UNI). UNI is a public institution with an enrollment of 11,470 students, at the time of this study. This enrollment included 10,515 undergraduates, of whom 1,549 (15%) were 25 years of age or older. UNI does provide a few on-going programs, structured gatherings, and workshops for adult students. UNI does not, however, recruit or treat adult students differently from the way it recruits or treats traditional-age students.

Currently, there are no valid and reliable measures of barriers to learning for adult students pursuing a college education. The measure used in this study, the Barriers to Learning Index, was developed by the researcher.

The findings of this study may not relate to adult students in two-year or urban universities or colleges. These colleges have traditionally served adult students and,

therefore, have been committed to this population for a longer period of time than have degree-granting institutions of higher education.

### **Significance of the Study**

The study of barriers to learning for adult students was the primary significance of this investigation. Literature reports that the types of barriers that hamper adult students as they pursue their educational goals are more frequently either institutional or situational barriers, rather than dispositional barriers. The disruptive and consuming nature of dispositional barriers warrants a deeper inquiry into the complexity of contributing factors.

Through an examination of the relationship between barriers to learning and learning styles of adult college students, implications may be drawn for how institutions of higher education can reduce their barriers to learning. Adult students will experience greater satisfaction in their educational pursuit as institutions respond to their role in providing an educational experience which adult students can cope with and adapt to. With curricula and program interventions in areas such as curriculum and instructional design and delivery, mentoring, advising, counseling, career development, and orientation programs, adult students can experience a more meaningful and valuable educational experience.

## **CHAPTER II.**

### **LITERATURE REVIEW**

#### **Introduction**

**This study is concerned with the relationship between perceived barriers to learning and the learning styles of adult students. The first portion of the literature review will focus on problems adult students experience as they pursue their educational goals and needs. It will review the ways adult students differ from traditional-age students, and barriers to learning, with particular attention paid to dispositional barriers. The second portion of the chapter examines adult development and the theoretical framework for this study.**

**The number of college students who are 25 years of age and over has been growing more rapidly than the number of college students under 25 years of age. It is projected that by the turn of the century 50% of the undergraduate student population will be adult students, 25 years of age and older (Aslanian & Brickell, 1988). The projection is supported by the Digest of Educational Statistics 1987 (p. 123), which reported that, from 1980 to 1985, enrollment of students under 25 years of age decreased by five percent, while the enrollment of students 25 years of age and older increased by 12 percent. Adult students in higher education are women, minorities, professionals seeking upgrading, and those who lost an earlier chance at college because of perceived lesser opportunities or ability (Weathersby and Tarule, 1980). Adult students represent varied ages, backgrounds, and learning experiences with numerous and varied needs and goals as they enter institutions of higher education.**



### **Differences Between Adult and Traditional-age Students**

Both Apps (1981) and Kasworm (1980) reported similarities between traditional-age and adult undergraduate students, although the two groups differ in several important ways. Traditional-age and adult students differ in their identities, motivations, familiarity with expectations of the academic system, and their obligations and responsibilities. Both traditional-age and adult students deal with their evolving self-identity, but from different perspectives. Most traditional-age students have not experienced an interruption in their formal education, as have adult students. Kasworm (1980) reported that "younger and older undergraduates are intellectually capable; however, these two groups represent significantly different composite backgrounds and orientations to the undergraduate environments" (p. 41).

In terms of background, adult students differ from traditional-age students in their concepts of identity (Kasworm, 1980). Adult students have many varied life, work, and community experiences which they bring into the classroom and through which they have formed their self-identity. Molding a new identity within the academic environment may create some confusion and conflicts with their public-sector identity. On the other hand, traditional-age students have limited life experiences to draw upon as they discover their self-identity. Their self-identity evolves from that of the parental environment to that of the college environment which envelops their peer-group living and social relationships.

Adult students also differ from traditional-age students in their motivation for entering college. Adult students are very often self-directed and highly motivated (Cross, 1981), explore college alternatives, and in deciding on college are committed and

purposeful in their pursuit of specific educational and career goals. Traditional-age students are more likely to be strongly influenced to attend college by parents or peers (Apps, 1981; Roelfs, 1975). Thus, traditional-age students more commonly have unclear or short-range educational and career goals (Kasworm, 1980; Roelfs, 1975).

Both adult students and traditional-age students will experience the need to adjust to their role in the academic environment. The break from formal education, however, may cause adult students to be insecure and fearful of entering or reentering academic life. Apps (1981) proposed that traditional-age students are more accustomed to the routines of academic life, while adult students, who experience a lapse of time from formal education, have to adjust to academic life. Adult students are often apprehensive of the new experiences of educational routines and procedures, study skills, writing, and testing practices. Traditional-age students, however, often view their undergraduate education as an extension of their compulsory education.

Still another difference between traditional-age and adult students is the obligations of the two groups of students. According to Apps (1981) and Kasworm (1980), adult students frequently have family and job responsibilities and community involvements which entail multiple roles. They may be involved in activities such as church, parent-teacher associations, or civic organizations. Traditional-age students are not as likely to be active in these activities, as they typically are not married, self-supporting, or established in the community. Their social network is more focused on campus relationships than is that of the adult student, whose social networks are within the community, family, and/or work environments. Multiple role responsibility characterizes adult students and contributes to the complications and complexity of being

a student.

Differences between traditional-age students and adult students -- such as the environments in which one's self-identity is formed; motivations for attending college; familiarity with academic routines; and family, job, and community obligations -- have created an increasingly diverse student body.

Some programs have been offered by institutions of higher education which specifically facilitate needs for adult students' access for higher education. To date, institutional response that meets adult students' educational needs includes programs such as night and weekend classes, classes at satellite locations, external degree programs, and adult student support services.

Although institutional response with these programs does satisfy some of the situational needs and institutional problems of adult students, these programs rarely address the issues of adult students' adapting to and coping with their learning abilities. Programs designed specifically for adult students which advance better understanding of how they think about the classroom, how they process learning, and how they feel about themselves as students are needed. If adult students are treated in the same way as traditional-age students with regard to these issues, they are likely to experience barriers to learning as they pursue their educational goals and needs.

### **Barriers to Learning**

Two early studies that are most frequently cited in the literature on barriers to learning are Carp et al. (1974) and Johnstone and Rivera (1965). These were large national surveys that included individuals from all educational levels and settings. The respondents were asked the reasons they did not participate in learning activities. Both

studies reported similar patterns, with cost and time as the primary barriers. Both barriers involve a variety of issues and may be interpreted differently by different people. It is difficult to speculate about whether adult students felt cost was a barrier because of their unwillingness to pay, or because of the value which they placed on learning, or because they did not have the resources and, therefore, were unable to pay.

With the recent increase in literature on barriers to learning activities, an interest was stimulated in more specialized areas of barriers concerning adult students enrolled in college. The studies, however, use similar survey instruments as previous studies to assess barriers to learning. Many of the studies concern returning adult women students.

Tittle and Denker (1977) reviewed factors of educational and career patterns related to re-entry college women. Their opinion was that institutions rarely provided climates to assist women with family responsibilities or women in need of financial assistance. They proposed that women's low aspirations and self-expectations posed "self-inflicted" barriers such as feelings of guilt, conflict, and ambivalence about the "proper" roles for women. They also suggested that psychological barriers were more complex than sociological barriers or institutional barriers because of the diverse individual differences in women.

Smallwood (1980) studied adult women community college students (N=392) to identify their problems and assess the intensity of these problems. The self-reporting instruments used for this study showed that the problem of greatest concern was coordinating child care, family responsibilities, and job schedules. Personal concerns, such as self-confidence and treatment as a student, were much less of a worry than the concerns related to their situations in life. Management of many and varied roles for

adult students is inescapable, but may distract or interfere with attention to the more intrinsic problems adult students experience in their learning experiences.

Moore (1985) studied women students over the age of 35 ( $N = 42$ ) and the barriers they experienced as they sought admission into college. She classified their perceived barriers into social, institutional, or psychological categories. From interview transcripts of the students, general institutional barriers (43%) were identified more often than were general psychological barriers (29%) or general social barriers (28%) as the women discussed their decisions to return to school. In addition to these general barriers, students were asked to identify major barriers formidable enough to have kept them out of school. In response to the question regarding major barriers, respondents cited social barriers (65%) over major institutional barriers (17%) and over major psychological barriers (17%). In addition, respondents identified institutional barriers (43%) more often than psychological barriers (29%) or social barriers (28%). When the respondents were asked for recommendations for aiding the adult college student who was enrolling or contemplating enrolling, institutional barriers (70%) were most frequently cited.

Other studies have examined barriers to learning of both men and women college students. Reports of survey methods and results in these studies were similar to those of the early studies and the ones on women students.

Marienau and Klinger (1977) refer to their study of 42 adult college students as an anthropological approach. Most of the students had completed nearly two years of previous experience in post-secondary education. The results of the interviews of these students were similar to the early survey literature. The most frequently reported

barriers included family responsibilities and lack of access to educational facilities, money, time, and motivation.

Lance, Lourie, and Mayo (1979) explored the difficulties of re-entry adult college students by sex and length of interruption in schooling. Subjects (N=583) were asked to check whether the 88 questions on the four-page questionnaire were applicable to them. The main difficulties reported were lack of time, time management, fear of dulled memory, and fear of failure. Students with longer periods of interruptions from schooling tended to express more academic-related difficulties than did students with short interruptions. The researchers reported that a greater proportion of women had difficulties than did men. A significant difference between men and women was reported with women expressing difficulties with children, guilt for spending family money, the fear of dulled memory, and guilt for pursuing one's own goal.

In support of the findings by Lance et al., Carne (1985) found that role strain existed for returning adult students. Carne referred to role strain as the felt difficulty in fulfilling role obligations. Females experienced a significantly greater degree of role strain than did males.

Richter (1983) studied anticipated and experienced barriers to learning perceived by adult students (N=111) enrolled in degree and certificate programs. Using a 31-item survey, she found that the barriers which were more of a problem than anticipated were situational and institutional, and included cost, lack of time, length of time required to complete the program, inconvenient scheduling of classes, uncertainty about the worth of college, home responsibilities, and lack of energy and stamina. Dispositional barriers that were reported to be less of a problem than anticipated included low grades in the

past and lack of confidence in ability. Lack of time was the barrier which adults most frequently anticipated incorrectly. They reported it to be more of a problem than anticipated as often as they reported it to be less of a problem than anticipated.

Flannery (1986) studied students 25 years of age and over (N=91) who had returned to college after an absence of at least three years. His study included a 25-item barriers-to-learning questionnaire. He reported that, in examining the perceived barriers to learning in relationship to the multiple roles of adults, the parent role was significantly related to the perceived intensity of the barriers becoming more intense as the roles increased in number.

Aslanian and Brickell (1988) followed their 1980 study, which reported on the causes and the timing of adult learning, with an investigation of the ways that adults study for college credit. The 1,000 students in degree and credit course programs were asked about their most- and least-wanted services. Results of these survey questions showed that the students most wanted convenient registration, parking space, financial help, practical applications of class material, help with jobs off campus, and academic and career counseling. The services least wanted included personal conveniences while on campus, such as public transportation, dorm affiliations, personal lockers and mailboxes, and organized social activities.

Although there are some similarities in the findings of these studies, the variety of survey instruments, techniques, and reporting formats contributes to imprecise conclusions about barriers to learning. One area in which this is observed is the variety of categories used to describe barriers to learning in different studies (Cross, 1978 and 1986; Long, 1983; Moore, 1985; Marienau & Klinger, 1977; Darkenwald & Merriam,

1982; Johnstone & Rivera, 1965; and Tittle & Denker, 1977). Types of barriers that emerged from the literature were institutional, structural, situational, social, personal, psychological, dispositional, psychosocial, internalized, and socialization. All, however, acknowledge the existence of institutional, situational, and dispositional aspects.

Boshier (1973) proposed a theoretical model of participation which included internal psychological and external environmental variables. Schlossberg, Lynch and Chickering (1989) proposed that different barriers are experienced during three different stages of adult students' educational pursuits: moving into, moving through, and moving out.

Cross (1978) synthesized more than 31 major national, state, and regional studies which assessed the needs and interests of adult students. From her review, Cross classified obstacles that deter adults from participation in organized learning activities under three headings: situational, institutional, and dispositional.

Institutional barriers, according to Cross (1986), are ". . . all those practices and procedures [of institutions] that exclude or discourage working adults from participating in educational activities . . ." (p. 98). The most frequently identified institutional barriers as perceived by adult students included not wanting to go to school full time, the amount of time required to complete the program, courses not scheduled when adult students could attend, and strict attendance requirements.

She defined situational barriers as ". . . those arising from one's situation in life at a given time" (p. 98). The most frequently identified situational barriers as perceived by adult students are cost, including tuition, books, and child care; not enough time; and home and job responsibilities.



Cross defined dispositional barriers as ". . . those related to attitudes and self-perceptions about oneself as a learner" (p. 98). The most frequently identified dispositional barriers as perceived by adult students included being fearful that they are too old to begin college, low grades in the past, lack of confidence in their ability to learn and compete with "younger" students, not having enough energy and stamina, and being unable to enjoy studying.

Cross (1986, p. 99) applied the three categories of barriers to learning to the research of Carp et al. (1974) in order to group barriers and to illustrate the relative importance of each. Her adaptations are shown in Table 1.

Of these studies, situational barriers were the most frequently cited barriers to learning, with cost of education and lack of time reported as the foremost barriers within the category. The second most frequently reported barriers to learning were institutional barriers, with not wanting to be a full-time student and time required to complete the program listed as the top barriers within this category. Dispositional barriers, third in reported frequency, were usually reported as a barrier only 5 to 15 percent of the time by survey respondents. Although dispositional barriers are listed only 5 to 15 percent of the time, Cross believes them to be seriously underestimated in importance. She thinks that situational and/or institutional barriers are reported more often than are dispositional barriers because they are considered to be more socially acceptable. According to Cross (1986), "it is far more acceptable to say that one is too busy to participate in learning activities or that they cost too much than it is to say that one is not interested in learning, is too old, or lacks ability" (p. 107).

Table 1. Perceived Barriers to Learning by Categories

Barriers	Percent of Potential Learners
<b>Situational Barriers</b>	
Cost, including tuition, books, child care, etc.	53
Not enough time	46
Home responsibilities	32
Job responsibilities	28
No child care	11
No transportation	8
No place to study or practice	7
Friends or family don't like the idea	3
<b>Institutional Barriers</b>	
Don't want to go to school full time	35
Amount of time required to complete program	21
Courses aren't scheduled when I can attend	16
No information about offerings	16
Strict attendance requirements	15
Courses I want don't seem to be available	12
Too much red tape	10
Don't meet requirements to begin program	6
No way to get credit or a degree	5
<b>Dispositional Barriers</b>	
Afraid that I'm too old to begin	17
Low grades in past, not confident of my ability	12
Not enough energy and stamina	9
Don't enjoy studying	9
Tired of school, tired of classroom	6
Don't know what to learn or what it would lead to	5
Hesitate to seem too ambitious	3

#### Dispositional Barriers

Darkenwald and Merriam (1982) referred to dispositional barriers as psychosocial barriers, and stated that "psychosocial obstacles tend to be related either to education or

learning as institutions or activities, or to the self as a learner or potential learner" (p. 139). Merriam (1984) proposed that dispositional barriers are probably more powerful barriers than are institutional or situational considerations, since dispositional barriers reflect past negative experiences with education and negative perceptions of oneself and one's abilities.

Cross' (1986) definition of barriers to learning views dispositional barriers as psychological perceptions about oneself as a learner. She reported that, of the three types of barriers, survey respondents infrequently identified dispositional barriers as factors that hampered them in their educational pursuits. Dispositional barriers appear to affect the feelings, emotions, attitudes, values, and self-perceptions of students that may not be as easily identified and, therefore, are not as readily accessible to modification as are institutional and situational barriers.

Given the personal and psychosocial nature of dispositional barriers, one might assume that these barriers would receive more attention than is reported in the literature. The question arises, then, as to the reasons why dispositional barriers have received so little attention in the literature and reasons why they are rarely identified as barriers to learning by adult students. Is it that dispositional barriers inherently are too difficult for adult students to admit? Is it that adult students truly do not experience dispositional barriers? Or, is it that adult students consider institutional and situational barriers to be more significant than dispositional barriers?

### **Problems Identifying Dispositional Barriers**

Boshier (1973) speculates that students tend to identify external factors rather than internal factors as reasons for non-participation. He stated

. . . incongruence, within self or between self and other, leads to anxiety, . . . and anxiety causes the individual to adopt defensive strategies which induce a closing of cognitive functioning to elements of experience (1973, p. 260).

The same phenomenon of externalizing problems rather than internalizing them may contribute to the nebulous nature of dispositional barriers. Adult students may view dispositional barriers as personal problems to be internalized and which are not as easily acknowledged or expressed as are situational and institutional barriers.

Marienau and Klinger (1977) expressed similar observations and conclusions from their research, stating

Barriers are derived from the situations people face and the value orientations people hold. Value-related barriers require personal readjustments by the adult learner and situational barriers have the potential to be overcome by external sources (pp. 11, 12).

An underlying factor in these studies tends to support Cross' (1986) contention that it is difficult to place faith in the capacity of people to analyze their own behavior. Just as researchers and professionals have difficulty understanding and explaining dispositional barriers, adult students have difficulties understanding, identifying, and expressing them. Although adult students may be able to perceive their concerns, they may have difficulty understanding them and, therefore, are unable to express dispositional barriers.

An additional factor contributing to the lack of attention to dispositional barriers may be a methodological weakness of the studies themselves. Cross (1986) criticized traditional methodologies for being insufficient and powerless to address dispositional barriers and their true effect on adult students' academic life. According to Cross (1986), methodological problems may contribute to the lack of "real" importance attributed to dispositional barriers. She suggested that the main methodological problem

in the study of dispositional barriers may be that adult students view dispositional barriers as socially undesirable and, therefore, are unwilling to admit to them.

An even more serious problem may be attributed to the lack of a theoretical foundation in studies on dispositional barriers. According to Cross (1986), there is a lack of theoretical basis for studies on barriers to learning for adult students. She stated that ". . . the construction and testing of plausible theories for examining barriers and explaining participation is a powerful tool that has not yet been adequately utilized in adult education (p. 108)." Further, Boshier (1978) believes that a theoretical framework is necessary ". . . to codify, summarize and impose or find meaning in a heap of disordered knowledge which exists in an emerging and diffuse discipline like adult education" (p. 12).

A theoretical framework is essential as a basis from which to explain dispositional barriers and understand their influence on adult students as they pursue their education. A sufficient theoretical basis provides an organized body of knowledge in which to recognize and explain dispositional barriers. The value of a theory is that it provides the basis by which to reveal the past and present effects of dispositional barriers and also gives a base of knowledge with which to predict how institutions of higher education can address dispositional barriers in the future.

### **Adult Development**

Adult students pursue their studies (in institutions of higher education) with varying needs, interests, and goals. The essential focus for a theoretical framework which facilitates understanding and explaining the significance of dispositional barriers is its sensitivity to the developmental perspective on the process of growth, change, and

transition among adult students.

Several theories have been advanced concerning adult life stages and developmental tasks. A common view among the developmental and life-stage theories is that, as adults move through life, they continually experience changes and transitions in their life structure. For example, Erikson (1950), Gould (1972; 1978), Havighurst (1972), and Levinson (1978; 1986) identify certain issues and adaptive tasks in age-linked periods.

Levinson (1986), for example, found that each period begins and ends at a well-defined average age with a variation of plus or minus two years. His developmental periods are described as follows (p. 8):

1. The Early Adult Transition, from age 17 to 22, is a developmental bridge between preadulthood and early adulthood.
2. The Early Life Structure for Early Adulthood (22 to 28) is the time for building and maintaining an initial mode of adult living.
3. The Age 30 Transition (28 to 33) is an opportunity to reappraise and modify the entry structure and to create the basis for the next life structure.
4. The Culminating Life Structure for Early Adulthood (33 to 40) is the vehicle for completing this era and realizing our youthful aspirations.
5. The Midlife Transition (40 to 45) is another of the great cross-era shifts, serving both to terminate early adulthood and to initiate middle adulthood.
6. The Early Life Structure for Middle Adulthood (45 to 50), like its counterpart above, provides an initial basis for life in a new era.
7. The Culminating Life Structure for Middle Adulthood (55 to 60) is the framework in which we conclude this era.
8. The Late Adult Transition (60 to 65) is a boundary period between middle and late adulthood, separating and linking the two eras.

Levinson's theory is not without controversy among psychologists and social scientists. He (1986) stated, however: ". . . I offer this viewpoint as a tentative, empirically grounded hypothesis, not as a fully demonstrated truth" (p. 11). His theory does provide a general framework of human development within which to view the

profound differences that often exist among classes, genders, and cultures (Levinson, 1986).

There are other adult development theorists who don't view adult life changes and development within age-related periods. Neugarten (1976) contends that there is not a growth schedule common for all individuals. She believes there is a normal expected series of life events, but these events may not occur in age-linked periods. Those life events which are not "on time" or anticipated, such as loss of a spouse or a job, are likely to be viewed as more traumatic than if anticipated or in a prescribed timetable.

Vivian Rogers McCoy (1977), drawing on the work of Gould, Levinson, and Vaillant, developed a practical and useful chart of seven developmental stages correlated with life cycle tasks which adults are likely to be involved in during the stages. For each of the stages – leaving home, becoming adults, catch-30, midlife reexamination, restabilization, preparation for retirement, and retirement – McCoy includes suggestions for educational program responses and outcomes sought in the programs.

During some periods in life, the motivation for learning is exceptionally high. Aslanian and Brickell (1980) referred to "trigger events" as that potent motivating force for learning. "Trigger events" in adult students' careers, families, and health create the need for learning by adult students (Aslanian & Brickell, 1980). These trigger events prompt a transition in which adult students move out of their current status and into a new status. Aslanian and Brickell defined transition as a change in status which establishes reasons to learn. The transitions force students to look in new directions to solve some of their conflicts. They found that 83 percent of adult learners named past, present, or future transitions in their lives as the motivating factor that caused them to

start learning.

Boshier (1971) described students who encounter transitions as they enter higher education to be "deficiency-motivated." He believes it is probable, however, that the amount of motivation which is "deficiency"-oriented changes as students pass through the transition. Further, Boshier believes that "deficiency"-oriented students are not in college just for the sake of pursuing educational ends, but are seeking a remedy to their particular deficiency.

Weathersby and Tarule (1980) had a similar view, as they saw education to be a support for transitions in the lives of adult students. They stated that "education is a developmental intervention of adults' lives, an activity that is by its very nature linked to processes of growth, development, change, and transformation" (p. 43).

Maslow's (1954) hierarchy of human needs model proposes that people's needs are organized in a hierarchical structure. A major premise of the model is that needs at the lower level must be relatively well satisfied before the higher-level needs are attained. If a lower-level need is temporarily inhibited or altered, the behavior aimed at achieving the higher-level need will be aborted. Therefore, the lower fundamental needs for survival, safety, and belonging must be met before there is concern about higher human needs such as competence, achievement, and self-actualization. For the adult student entering the academic environment, needs which were once satisfied may be abandoned in the new environment. The adult student must once again satisfy lower hierarchical needs. The adult student will have to reestablish him/herself in the new environment; gain an identity with students, faculty, and staff; define an orderliness for many tasks and responsibilities; and acquire an independence in the student role, which is



traditionally a dependent role.

Kolb provides a concept of growth and development in learning which is useful in this study. Kolb and Fry (1975) proposed that the human growth process is divided into three broad developmental stages, with movement from simple to greater complexity in learning. These developmental stages -- acquisition, specialization, and integration -- are described as follows:

The first stage, **Acquisition**, extends from birth to adolescence and marks the acquisition of information of basic abilities and cognitive structures. The second, **Specialization**, extends through formal education and/or career training and early experiences of adulthood in work and personal life. In this stage, development primarily follows paths that accentuate a particular learning style. Individuals shaped by social, educational and organizational socialization forces develop increased competence in a specialized mode of adaptation that enables them to master the particular life tasks they encounter in their chosen career (in the broadest sense of the word) path. This stage, in our thinking, terminates at mid-career although the specific chronology of the transition to stage three will vary widely from person to person and from one career path to another. The third stage, **Integration**, is marked by the reassertion and expression of the non-dominant adaptive modes or learning styles. Means of adapting to the world that have been suppressed and lay fallow in favour of the development of the more highly rewarded dominant learning style now find expression in the form of new career interests, changes in life style and/or new innovation and creativity in one's chosen career.

Through these three stages growth proceeds from a state of embeddedness, defensiveness, dependency, and reaction to a state of self-actualization, independence, pro-action, and self-direction. This process is marked by increasing complexity and relativism in dealing with the world and one's experiences and by higher-level integrations of the dialectic conflicts between the four primary adaptive modes -- Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation (Kolb and Fry, 1975, p. 41).

Students who reach the peak of their learning development progress to the level of integration. The integration level of development "is accomplished by higher-level integration of non-dominant modes of dealing with the world" (Kolb, 1984, p. 144). Kolb contends that this level is difficult for all students to attain. He proposes that

students may even oscillate from one developmental stage to another depending on their past life experience and the demands of the present environment.

Kolb conceives of the developmental process of experiential learning as being "marked by increasing complexity and relativism in dealing with the world and one's experience and by higher-level integrations of the dialectic conflicts among the four primary learning modes" (Kolb, 1984, p. 140). Achieving the peak of learning maturity is dependent on integrating skills in four modes of learning: concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE). This level of maturity is achieved as the four learning modes become more highly integrated at the higher stage of development. Kolb associates four personal growth dimensions – behavioral complexity, symbolic complexity, affective complexity, and perceptual complexity – with each of the four adaptive learning modes (refer to Figure 1 for a visual picture of this process). As the four adaptive modes are integrated, the four growth dimensions consolidate at the integration level of development.

The complexity and demands of adult students' life situations contribute to the difficulties of attaining or maintaining the integration level of learning maturity. Like Boshier, and Aslanian and Brickell, Kolb believes adult students enter higher education with developmental needs created by their personal and professional life transitions. The uncertainties of the transitional phase may cause adult students to examine their self-identity and their relationship to their environment. Further, adult students who have experienced success and recognition through their work, family, or community may now struggle with instability during this transition and with adaptations to the learning environment.

Balancing the uncertainties of the transitional phase and the new learning experiences may also cause adult students to examine their self-worth and their relationship with their environment. During this period of immersion in self-examination, adult students may regress to a less mature stage in their learning development. Their frustrations and lack of confidence may accumulate as they struggle with self-identity, a new learning environment, and doubts about their abilities as learners. A lack of confidence as a learner may lead to a different, an unfamiliar, and an elementary stage of their learning development: acquisition.

Kolb has expressed an additional problem which could interfere with adult students gaining the integration level of learning maturity. He believes society's reward system does not accommodate the integration level of maturity. The specialization function of careers and jobs places adult students in a position of conflict between the social demands of specialization and their personal fulfillment of learning maturity. Adult students who come from a specialized work setting may gradually experience the transition; others may experience a life crisis with a dramatic transition, while still others may never experience the transition into the integration stage of development.

Kolb's concept of growth and development is an insightful structure with regard to the basic skills needed for taking in and transforming information in the learning process. Students who have not acquired the basic competencies for learning using the four learning modes may experience problems adapting to the learning environment. These problems are likely to produce anxiety about ones' ability to learn. Due to the intrapersonal nature of these problems, they are referred to as dispositional barriers. Kolb's concept of growth and development of learning is of value for studying the skills

students have as they cope with and adapt to the learning environment.

### **Learning Styles**

A review of the literature reveals that there has been considerable interest in identifying, classifying, and measuring the factors which explain how and why individuals learn differently. There are many diverse tests and instruments available for assessing how individuals learn. Some claim to assess learning styles and others claim to assess cognitive styles. The great diversity in these tests and instruments, however, leads to confusion in terminology, definitions, and conceptualization. There is as yet no unifying or convergent model which explains how individuals learn.

One factor which contributes to confusion is the use of the terms "learning style" and "cognitive style." Keefe (1987) stated that "learning style and cognitive style have often been used synonymously in the literature although they decidedly are not the same" (p. 5). Curry (1981) reported that the two concepts are used interchangeably and that neither concept has been clearly defined nor consistently applied. These inconsistencies are related to the various definitions and descriptions of these two terms

**Cognitive Style:** Cognitive style has been defined and explained in several ways. The term "cognitive style," coined by Allport in 1937, referred to a quality of living and adapting influenced by distinctive personality types (Keefe, 1987). Witkin et al. (1977) viewed cognitive style as stable over time; however, "this does not imply that they are unchangeable; indeed, some may easily be altered" (p. 15). Others conceive of cognitive styles as stable personality traits.

Messick and Associates (1976) referred to cognitive style as ". . . stable attitudes, preferences, or habitual strategies determining a person's typical modes of perceiving,

remembering, thinking, and problem solving" (p. 5). He suggested that these particular habitual modes of processing information are ones which develop slowly and experientially, and which are not easily modified. An individual with a given cognitive style may employ a wide range of strategies in response to differing tasks and situations, but the cognitive style, once established in the personality, tends to endure. Curry (1981) concluded that cognitive styles are habitual modes of processing information which develop slowly and experientially, are not easily modified, and are distinct from intellectual or cognitive abilities. She stated that ". . . cognitive styles belong to those deeply rooted individual differences commonly classified as personality differences" (p. 51). Cognitive style tests such as The Myers-Briggs Type Indicator, Witkin's Field Equivalency Test, and Hill's cognitive style mapping are three of the most-researched models (Curry, 1983; Claxton & Murrell, 1987).

**Learning Style:** Thelen (1954) has been given much of the credit for coining the term "learning style," in discussing the dynamics of group work (Keefe, 1987). Keefe (1987) conjectured that "learning style" is the broader term and that it includes cognitive styles. Gregorc (1979) stated that "(learning) style appears to be both nature/nurture in its roots. Patterns of adapting to environments are apparently available to us through our genetic coding system . . . through our environment and culture . . . (and) within the subjective part of our individual natures" (p. 234). Kolb (1984) defined learning style as the pattern of processing activities that the individual typically engages in during learning. A common factor among these definitions is that learning style is a set of learned behaviors which are changeable and adaptive. Inventories such as Kolb's Learning Style Inventory (LSI), Schmeck's Inventory of Learning Processes, and the

Grasha–Riechmann Student Learning Style Scales (SLSS), have been identified as learning style inventories (Curry, 1983; Farrell, 1983).

**Contrasting elements:** Although cognitive style and learning style have been used interchangeably and synonymously, there are some distinguishing elements. The term cognitive style is most commonly used to refer to the more stable personality traits of individuals. Learning style, however, is distinguished by assessing the influence of or interaction with factors external to the individual (Curry, 1981).

A second distinguishing element between cognitive style and learning style tests are the theories upon which the instruments or models are based. Grasha (1981) suggested that many of the instruments do not seem to have evolved from a single theoretical framework. "They are grounded more in the experiences of the authors than in theories of human learning" (Grasha, 1981, p. 32). He identified tests and inventories such as The Myers Briggs Type Inventory (MBTI), Witkin's Embedded Figures Test, Kolb's Learning Style Inventory, and Schmeck's Inventory of Learning Processes as evolving from a theoretical framework.

Of the instruments which were derived from a theoretical foundation, The MBTI, a cognitive styles inventory, is based on Jung's theory that behavior is due not to chance but results from observable and measurable differences in mental functioning. Jung postulated two basic bi-polar mental processes (sensing–intuition and thinking–feeling) and two fundamental orientations to life (extraversion and introversion). The MBTI adds a fourth dimension (judgment–perception) to identify the dominant mental process of individuals.

Witkin's Field Equivalency, researched primarily by Witkin and associates,

examines how individuals perceive a portion of a field from the entire field. Derived from Lewin's field theory, tests were developed to reveal how persons identify figures embedded in a field to discern analytical versus global perception.

Schmeck's Inventory of Learning Processes contrasts deep and shallow information processing. Learning style is the product of the organization of a group of information-processing activities that individuals prefer to engage in when confronted with a learning task ranging from deep and elaborative to shallow, repetitive, and reiterative.

Kolb's Learning Style Inventory evolved from his concept of the developmental and changing process of experiential learning. The experiential learning concept is based on the works of Dewey, Lewin, and Piaget, in which learning is viewed as a transactional process between the learner and the learning environment. Experiential learning evolves as a four-stage cycle from concrete experiences, reflective observations, abstract conceptualization, to active experimentation. These four points on the experiential learning cycle are adaptive modes of dealing with information or adapting to the world.

A theory-based model is of value in this study as there has been a lack of a theoretical foundation in previous research on barriers to learning. It was conjectured that a theory-based model will facilitate an explanation for dispositional barriers.

All four of the models identified by Grasha are theoretically grounded and have been extensively researched. Some of them assess personality traits while others assess the transactional learning process. Both The MBTI and Witkin's Field Equivalency Test assess the stable and unchanging personality dimensions of individuals. Schmeck's Inventory of Learning Processes is referred to in the literature as a learning style model.

It was developed to assess only how individuals process information; that is, whether learners think deeply about what they are learning. This model does not assess both how learners take in and transform information.

The experiential learning theory, from which Kolb's Learning Style Inventory is based, describes learning as a process whereby concepts are derived from and continuously modified by experience. A characteristic of experiential learning is its emphasis on the learning process rather than only behavioral outcomes (Kolb, 1984). Kolb conceives of learning as a process whereby knowledge is created through the transformation of experience. He contends that an individual's learning style evolves throughout life, and that the effectiveness of learning strategies varies with the learning task. Of the models examined, Kolb's LSI was selected for use in this study as it is theoretically grounded in human growth and development and conceives of learning as an adaptive and transactional process.

### Theoretical Framework of the Study

Kolb developed his model of experiential learning from his concept of individual growth and development. This model is a means for mapping the different developmental paths. Kolb integrates the four adaptive modes, the four learning styles, and movement from simplicity to greater complexity in learning. The visual representation of the relationship between learning and individual development is depicted in the "cone" (Figure 1).

The experiential learning model was derived from the works of Dewey, Piaget, and Lewin in which the major role of learning is attributed to experience. John Dewey (1938) addressed the aspects of observation of conditions, knowledge of past similar



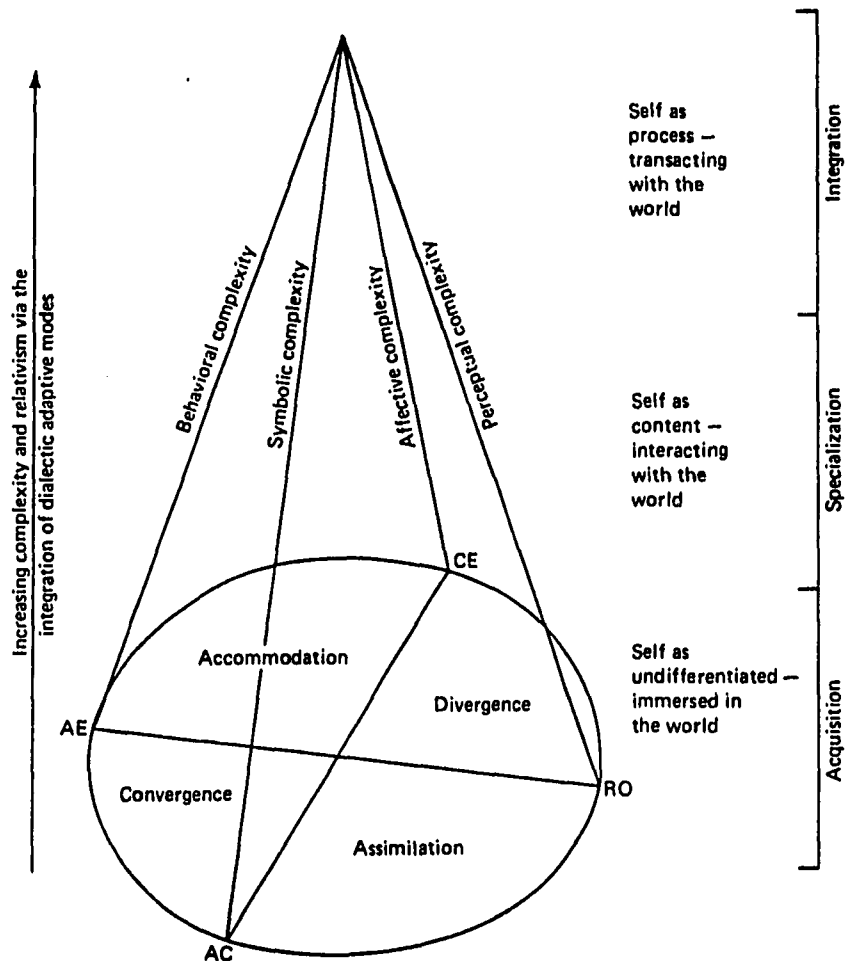


Figure 1. The Experiential Learning Theory of Growth and Development (Kolb, 1984, p. 141)

circumstances, and judgment toward a moving force. His view stressed the role of education as developing intellectual anticipation with the idea of consequences to blend with desire and impulse; that is, ideas giving direction to impulses. In addition, Dewey proposed that development includes decentering; that is, from the self to concerns for the

larger world.

Kurt Lewin (1951) considered two aspects to be significant concerning group dynamics and T-groups: immediate personal experience and necessary feedback concerning goals and consequences of action.

Jean Piaget's studies (1964, 1972) of cognitive development were limited to the years from birth to adolescence. However, his theory has influenced researchers and educators. Piaget asserted that each act of learning derives from an ongoing process which involves assimilation and accommodation. The process consists of taking in and absorbing or synthesizing what the new learning means for the learner in the way of adaptation.

Kolb's experiential learning model proposes that learning, growth, and change are best facilitated by an integrated process or four-phase cycle of learning (Figure 2). The

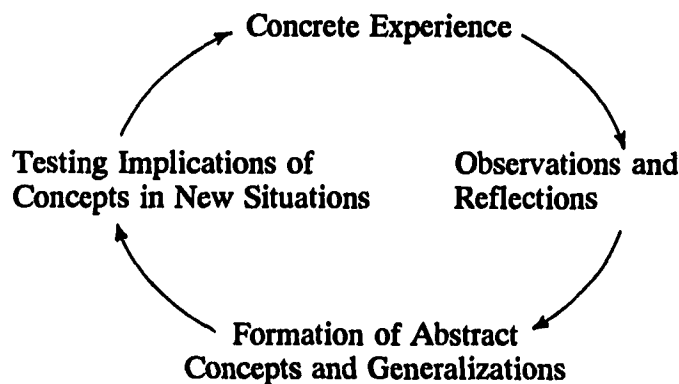


Figure 2: The Experiential Learning Model  
(Kolb & Fry, 1975)

cyclical movement through these phases begins with "1) here-and-now experiences followed by 2) collection of data and observations about that experience. The data are

then 3) analyzed and the conclusions of this analysis are fed back to the actors in the experience for their use in the 4) modification of their behavior and choice of new experiences" (Kolb & Fry, 1975, p. 33). This model describes learning as a process with a continuous cycle through the four stages of the model. Testing of concepts leads to new information, and the learning cycle is repeated.

### Kolb's Learning Style Inventory

Kolb's concept of learning styles is based on his experiential learning model. At the four stages of the experiential learning cycle, Kolb identifies four adaptive learning modes in which students acquire skills. These four modes are ways students deal with their educational environment: concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE). Claxton and Ralston

	<u>Ability</u>	<u>Description</u>	<u>Emphasis</u>
1)	Concrete Experience (CE)	The learner involves herself fully in the new experience.	Feeling
2)	Reflective Observation (RO)	The learner observes and reflects on the experiences from different perspectives.	Watching
3)	Abstract Conceptualization (AC)	The learner creates concepts that integrate their observations into sound theories	Thinking
4)	Active Experimentation (AE)	The learner uses the theories to solve problems and make decisions.	Doing

Figure 3: Learning Modes, Descriptions, and Emphasis

(1978) produced a chart (Figure 3) which described each of the four modes and the particular emphasis for each mode (p. 28). To be effective, the learner needs four kinds

of abilities.

Kolb proposed that the learning process is a combination of the four learning abilities, with two of the four being polar opposites. The first combination is a continuum which requires skills for taking in information and the second continuum requires skills for transforming the information, as shown in Figure 4.

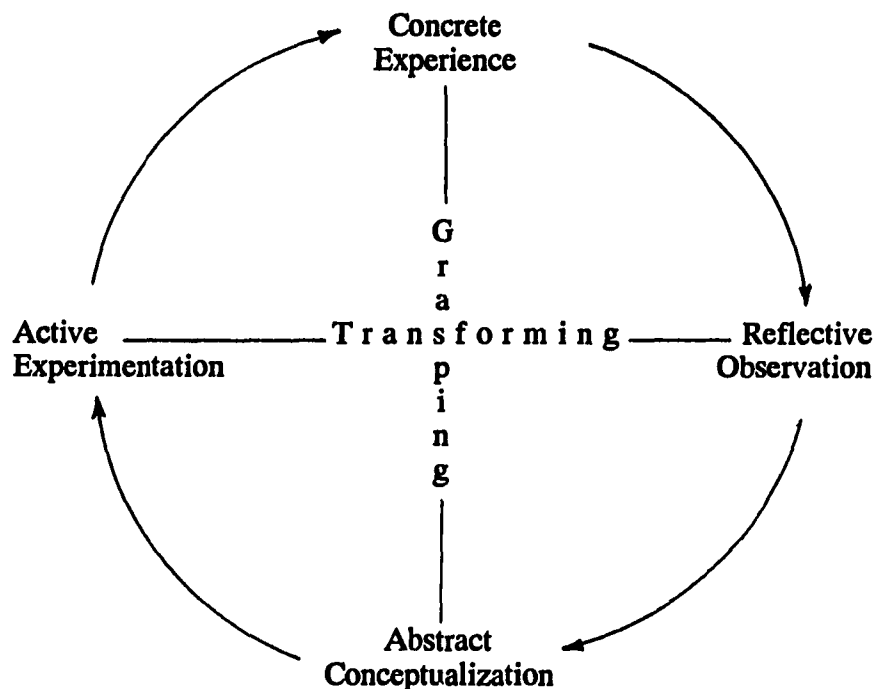


Figure 4: Kolb's Model of Experiential Learning  
(Claxton & Murrell, 1987, p. 26)

The continuum for taking in information requires skills in concrete experience (CE) and abstract conceptualization (AC), while the continuum for transforming the experience requires skills in reflective observation (RO) and abstract experimentation (AE). As students experience new situations, the learning process requires them to involve varying abilities from the two dialectically opposed dimensions. They must

choose the ability upon which they will focus in the new learning situation. This choosing process creates tension which the student seeks to resolve (Kolb & Fry, 1975). Resolution of this tension in learning situations forms the individual's characteristic learning style.

Over time, accentuation forces operate on individuals in such a way that the dialectic tensions between these dimensions are consistently resolved in a characteristic fashion. As a result of our hereditary equipment, our particular past life experience, and the demands of our present environment, most people develop learning styles that emphasize some learning abilities over others. . . . Each of us in a unique way develops a learning style that has some weak and strong points (Kolb, 1976, pp. 4, 5).

A combination of these four learning abilities shows students' preferred learning styles. Learners who favor both CE and RO are labeled divergers, learners who favor both RO and AC are labeled assimilators, learners who favor both AC and AE are labeled convergers, and learners who favor both AE and CE are labeled accommodators (Kolb, 1976). These different approaches to learning are described as follows:

1. Divergers (feeling): Tend to see problems from all sides, and are person-oriented, imaginative, emotional, and generators of ideas.
2. Convergers (doing): Tend to be simplifiers, task-oriented, practical, and unemotional, and prefer things to people.
3. Assimilators (thinking): Tend to be theory-based problem solvers and abstract creators of models, and prefer ideas to people.
4. Accommodators (sensing): Tend to be doers and risk takers, and are intuitive, learn by trial and error, and adapt to immediate circumstances.

#### **Research on Kolb's Learning Styles Inventory**

Kolb's LSI has been utilized in a variety of ways and in several fields to assess

how individuals learn and how teachers teach. The LSI has been used extensively to assess learning styles in different academic disciplines. Kolb (1981b) reported that several students revealed patterns of relationships among academic fields and learning styles. He summarized the clustering of social professions (education, social work, and law) as accommodators, humanities and social sciences as divergers, and natural sciences as assimilators, while science-based professions (most notably engineering) clustered as convergers. Similarly, Kolb's (1985) Learning-style Inventory: Self-scoring Inventory and Interpretation Booklet lists careers in organizations, business, and promotion as accommodators; careers in service organizations, arts, and entertainment as divergers; information careers and science as assimilators; while careers as specialists and technology as convergers.

Kolb (1984) examined the undergraduate majors of 800 practicing managers and graduate students in management. He found variations in learning styles that were strongly associated with their undergraduate majors. Although they were not all currently students, the subjects had all shared a common career choice. Kolb concluded that undergraduate majors are a factor in forming an individual's learning style. From this study he found that undergraduate business majors tended to be accommodators; engineers tended to be convergers; English, history, psychology, and political science majors tended to be divergers; and mathematics, chemistry, economics, and sociology majors tended to be assimilators. Physics majors fall between converger and assimilator.

These findings support Kolb's assertion that an individual's learning style can be modified and that learning and development are a transaction between an individual and the learning environment. Kolb (1984) contends that, if a learning style is matched with

the appropriate academic area, students will perform at higher levels. If a mismatch does occur between students' learning styles and their academic areas, the individual either will change to conform to the discipline or leave the field.

Learning styles were reported to be modified by nursing students in higher education. Lissan (1984) studied the learning styles of registered nursing students and "generic" student nurses enrolled in baccalaureate nursing programs (N=126). She reported that, as both groups of students progressed toward the senior year in college, they became less fixed in one learning style, showing a tendency to become better able to learn through a variety of modes. She expected that students would move to greater abstraction as they grew older. As students develop the capacity to learn in a variety of learning modes, they attain the skills to cope with and adapt to the educational environment.

Dorsey and Pierson (1984) used Kolb's LSI in their descriptive study of the learning styles of adult students (N=513) in undergraduate non-traditional occupational education programs. They found that there was a change to accommodator learning style in adult students and that age and prior experience affected learning style more than did sex or ethnicity.

Pigg, Busch, and Lacy (1980) examined the relationship between learning styles and occupational roles and the self-reported educational activities of cooperative extension agents (N=349). They reported that the dominant learning style type of the county extension agents studied was that of accommodator (44%). Although this is different from Kolb's results, Pigg et al. propose that this may be because of the individual's learning styles being modified by the work environment. This study found

only a minimal correlation between the perceived relative importance of educational techniques and how well the subjects learned from each technique. The researchers believe, however, that the LSI does capture tendencies in personal learning behavior and that it is a useful device in the actual conduct of educational programs or in a participatory approach to the development of adult education programs.

Fox (1984) examined the construct validity of the LSI based on the analysis of data for 54 health professionals attending a continuing education conference. The study failed to support a relationship between learning styles of health professionals and their scores on evaluative statements or preferences for lecture or small-group methods. Fox questioned the usefulness of the LSI as a guide to educational design decisions and raised questions about the validity of the LSI.

Korhonen and McCall (1986) were more supportive of the result of the LSI in matching learning styles and learning environments. They studied adults in non-credit programs to examine learning styles as they interact with two learning environments. The conforming environment included factual course material presented solely through lectures. The independent environment placed an emphasis on ideas rather than facts, with active participation of students in the learning process. Their results showed that learning style and learning environment did interact to affect achievement. Of the four learning styles, accommodators and divergers scored highest in classes which emphasized remembering by either recognition or recall. Assimilators and convergers scored highest in classes in which understanding the literal message contained in the communication was featured.

The findings from Kotar's (1980) research of 262 graduate and undergraduate



students support the usefulness of Kolb's LSI. Kotar found a relationship between learning styles and personal characteristics -- such as sex, parental status, undergraduate major, and preferred instructional type -- associated with the individual's current and anticipated career. According to Kotar, "the instrument appears to provide valuable information concerning expression of learning styles by individuals and may be useful in planning instructional activities" (p. 107).

Mark and Menson (1982) found Kolb's experiential learning theory and LSI valuable in portfolio development courses. These courses were designed to ease adult students' transition into the university. The experiential learning theory and LSI were used as an instructional aid, to identify special characteristics of adult students, and to aid students in future organized educational activities. Although this program has not been submitted to formal research, they reported that students in the study often reported an increased sense of self-esteem and self-understanding.

Using a learning style inventory such as Kolb's LSI was advocated for designing management training programs. Dixon (1982) supported the identification of participants' learning styles for conducting workshops. The information obtained from the inventory would be used in pre-meeting planning to meet the needs of the majority of participants, to evaluate workshops, and to be used by the participants to understand better how they learn. Dixon contends that knowing how one learns will enhance one's learning while on the job.

Since it is most likely that each of the four learning styles will be represented in a workshop or class, it would be prudent to use more than one teaching style. In this way, according to McCarthy (1981), all students will "get a chance to 'shine' 25 percent of the

time" (p. 47).

Kirk (1986) used Kolb's LSI to explore the relationship between students' learning styles and their levels of intellectual development. Her study of 70 adult college students found that learning styles did correlate with grade point average and parental education. However, age, gender, and college major/minor did not correlate significantly. Kirk reported that, of the four learning styles, accommodators were most likely to earn high grade-point averages. She was unable to support the relationship of learning styles with choice of academic major, as Kolb had established previously.

There is an aspect of Kolb's concept of growth and development in his experiential learning theory which has not been explored. According to Kolb, achieving the peak of learning maturity is dependent on the integration of four modes of learning: concrete experience, reflective observation, abstract conceptualization, and concrete experience. If this thesis is correct, then students with balanced learning styles (skills in all four modes) will be better prepared to adapt and cope with the learning environment than with the students with dominant learning styles (the lack of skills in all four modes).

### Conclusion

Adult students' motivation for learning frequently involves unresolved issues which are influenced by transitions in their personal or professional lives. Although the transitions create the need for learning, they entail excess "baggage" to be resolved within the learning environment. Adult students are usually highly motivated, self-directed, and committed to their educational pursuits. Although they come from an experience-based background, they enter the academic system unsure of their student role and unclear about the expectations of the academic environment.

Studies have examined the problems adult students experience in the academic setting. Research on barriers to learning provide different answers and perspectives on the problems adult students experience in their educational pursuits, which makes precision in conclusions difficult. It is even more difficult to identify and explain the "real" importance of dispositional barriers from these studies. Institutional and situational barriers have been more frequently identified as problems for adult students than have dispositional barriers.

In the absence of a theoretical framework in previous studies on barriers to learning, this study was developed upon the experiential learning theory of David Kolb. His experiential learning theory is grounded in the concept of individual growth and development related to learning. Based on Kolb's developmental perspective on the process of students' growth and development, he developed the Learning Style Inventory. The LSI, used in this study, assesses students' learning style preference.

According to Kolb (1976 and 1984), students with skills in all four modes of learning will be better prepared to meet the variety of educational conditions they will encounter in higher education. Those who do not have skills in all four learning modes will have difficulty adapting and coping with the educational environment. For adult students, the difficulty in adapting to the educational environment is compounded by their struggles to cope with their professional or personal life transitions. They may suddenly find themselves at a lower stage of development in their learning skills as they deal with the transition that brought them into the learning environment.

Lack of skills, inadequate adaptation, and inability to cope with the educational condition create problems for students as they pursue their educational needs and goals.

**Some adult students may withdraw from the learning environment, while others may persist but with an unfulfilling educational experience.**

### **CHAPTER III.**

### **METHODOLOGY**

#### **Introduction**

The purpose of this study was to explore the relationship of adult students' perceived barriers to learning with their preferred learning styles. A causal-comparative design, one that examines the degree or strength of relationship between and among variables (Moore, 1983), was used. It was hypothesized that there is a relationship between the congruence of the educational goals and needs of undergraduate adult students and the difficulties they experience in their educational pursuits. It was also conjectured that there is a relationship between undergraduate adult students' learning styles and their ability to adapt to the learning environment.

#### **Setting of the Study**

The study was conducted in the spring of 1989 among a sample of adult students attending the University of Northern Iowa in Cedar Falls, Iowa. The University was established in 1876 as the Iowa State Normal School, offering a program of instruction and training of teachers. The institution was renamed the Iowa State Teachers College in 1909. The name of the college was changed in 1961 to the State College of Iowa. In 1978, the mission of the institution was changed to that of an arts and science university, and it was renamed the University of Northern Iowa (UNI).

UNI offers curricula at both the undergraduate and the graduate levels. Degrees offered at the undergraduate level are Bachelor of Arts, Bachelor of Arts – Liberal and Vocational Arts, Bachelor of Arts – Teaching Program, Bachelor of Fine Arts, Bachelor

of Music, Bachelor of Science, Bachelor of Technology, and Bachelor of Liberal Studies. Degrees offered at the graduate level are Master of Business Administration, Master of Arts in Education, Master of Arts, Master of Music, Master of Philosophy, Specialist in Education, Doctor of Education, and Doctor of Industrial Technology.

### Universe of Study

The universe of this study consisted of all undergraduate students who were 25 years old or older during the spring of 1989. At that time, UNI had a total enrollment of 11,470 students. Among that number, 10,515 were undergraduate students, of whom 1,549 (14.7%) were 25 years old or older.

At the time of the study, about 96% of all UNI students were white Iowa residents, predominantly from the northeastern quadrant of the state. Most of the students had graduated from high schools with enrollments of fewer than 300 students. The average age of the undergraduates was 22 years, with more than half of the total student body being women. The most popular undergraduate declared major was elementary education, with 28% of the undergraduates having declared majors in the teaching curricula.

### Research Instrument

A mailed questionnaire of three parts was used to collect the data for this study. The first part measured adult students' perceived "Barriers to Learning." The second part consisted of Kolb's (1985) Learning Style Inventory, while the last part was devoted to student demographic (background information) questions. Each of these sections is discussed below.

### **Barriers to Learning Index**

As the reader will recall (see Introduction, p. 2, and Review of the Literature, pp. 13–23), many adult students are confronted with obstacles as they pursue their educational goals. These obstacles (generally referred to as disruptive factors or barriers) have been categorized by Cross (1986) as being either "institutional," "situational," or "dispositional" in nature.

The author developed a series of 53 (Likert-type) statements which were reflective of the three dimensions (i.e., institutional, situational, and dispositional) of the barriers to learning concept. These statements evolved from the works of Cross (1986), Flannery (1986), Richter (1983), Apps (1981), and Aslanian and Brickell (1988). Since there was no measuring instrument which assessed barriers to learning specifically for adult college students, a questionnaire was developed for this study.

The dispositional barrier dimension items focused on students' attitudes about themselves. Dispositional barriers are psychological perceptions about oneself as a learner which cause difficulties for a student in his/her educational pursuits. The following are examples of some statements which attempt to measure dispositional barriers: "Feeling uneasy about visiting with instructors." "Not having enough time to complete exams." "Being overwhelmed with all I need to know." "Feeling older than other students." "Experiencing stress in classes and studying."

The institutional barrier dimension included obstacles for which the university is directly responsible. Institutional barriers consist of practices and policies of institutions of higher education that discourage or inhibit adult students' educational pursuits. The following are examples of some statements which attempt to measure institutional

barriers: "Getting registered for classes." "Availability of campus parking." "Having classes available at convenient times." "Having faculty available for appointments when I am on campus or available." "Getting career or academic advising."

The situational barrier dimension included obstacles which are generated by adult students' life circumstances. Situational barriers consist of limitations in adult students' educational pursuits brought about by situations related to one's job, family, age, or economic state. The following are examples of some statements which attempt to measure situational barriers: "Paying for the cost of tuition." "Having my family understand the demands on me as a student." "Having job responsibilities." "Having enough time for assignments or studying." "Having competent child care."

In its development, the Barriers to Learning Index was subjected to tests of validity. Several educators evaluated the items for content and face validity. Each item in the index that did not clearly represent a barrier to learning or did not seem to measure the specified barrier dimension was either rewritten or deleted.

An initial pre-testing of the index was conducted in March, 1989. Twenty-five adult students were selected using a non-probability sampling plan and were asked to participate in this pre-test study. The students were instructed to read each of the 53 statements and indicate the extent to which the statements represented a problem for them in their pursuit of a university education. The Barriers to Learning Index questionnaire included the following instructions:

**Directions:** Listed below are tasks, activities, responsibilities, and feelings that students experience as they pursue their education. Please read each statement and circle the extent to which the item is a problem for you in pursuing your university education. If an item does not apply, do not circle a number.



The scale used for the Barriers to Learning Index ranged from 1, "Not a Problem," to 7, "Major Problem," as illustrated below:

Not a Problem							Major Problem
	1	2	3	4	5	6	7

The results of this pre-test were subjected to both descriptive and inferential statistical analysis. For example, factor analysis was used to examine whether there was a clustering of interrelated variables reflective of the three dimensions of the Barriers to Learning Index. Cronbach's alpha was used as a measure of the overall reliability of the index and as a guide in deciding which of the 53 statements did or did not contribute to the dimension they were designed to measure. These statistical tests were used as a guide in determining which items to retain, delete, or to be rewritten. The results of this initial pre-testing of the index resulted in ten of the original 53 items being either deleted or rewritten.

A pilot study was conducted in April, 1989, to examine the effectiveness of the 43 restructured items in the Barriers to Learning Index that resulted from the pre-test, to incorporate Kolb's Learning Style Inventory, and to incorporate student background information items (discussed below) into the questionnaire. In addition, the pilot study was used to measure the questionnaire response rate. Sixty students, randomly selected from the universe under study, were mailed a cover letter, questionnaire, and business reply envelope and asked to participate in the study. This questionnaire was nearly identical to the form which was eventually used in the formal phase of the study (see Appendix D). Of the 60 questionnaires mailed, 27 (45.0%) were returned. Once again,

the Learning to Barriers Index was subjected to both factor and reliability analysis. This analysis indicated that no changes were needed on the Barriers to Learning Index.

For the formal phase of the study, the internal reliability of the Barriers to Learning Index was found by computing Cronbach alpha coefficients of reliability for the three barrier dimension statements. The results of the Cronbach alpha coefficient for the study (N=427) were dispositional barriers, .84; institutional barriers, .85; and situational barriers, .87.

Mean scores were obtained for responses on each barrier item. Low scores indicated no problem and high scores indicated a major problem. Barrier items with no response indicated that the items did not apply and, therefore, were not included in the mean scores. Means were computed for dispositional, institutional, situational, and total barriers scores.

### **Kolb's Learning Style Inventory**

The preferred learning styles of adult students were assessed using Kolb's (1985) "Learning Style Inventory" (LSI). The LSI (see Appendix D) consists of 12 simple sentence-completion items. For each item, respondents are asked to rank-order four sentence completions that correspond to the four learning modes: concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE).

Kolb's LSI was selected for use in this study because it is theory-based, it is grounded in adult development, and its function is to assess learning style types. In addition, Kolb's LSI is straightforward and relatively easy for students to complete, it is brief and comprehensive, its terminology is appropriate for adult college students, and it

is easy to score.

**Validity:** The experiential learning theory, which the LSI is based on, has received wide spread support in the literature (Claxton and Ralston, 1978; Claxton and Murrell, 1987; Chickering, 1981; Curry, 1983; Farrell, 1983; Kotar, 1980; and Mark and Menon, 1982). Curry (1983) described Kolb's theory of experiential learning and learning styles as one of the prominent theories of information processing style. Kolb's LSI has been subjected to 20 years of ongoing research and has received broad use in fields such as education, medicine, social work, engineering, and management. The continued use of the LSI would suggest that it seems to measure factors of significance to learning style preferences.

The Tenth Mental Measurement Yearbook (1989) refers to the LSI as a promising measurement, but stated that there were questions regarding its validity that needed further research. The LSI has been challenged on both its validity and reliability (Fox, 1984 and Stumpf & Freedman, 1981). Kolb (1976) attempted to provide validity for the LSI using correlational studies that related the LSI scores to performance tests, personality tests, and preferences for learning situations and teachers. The results of correlating the LSI with these tests revealed poor measurement qualities.

Kolb (1976), however, reported some consistency between the LSI and the MBTI in selected areas where both tests were perceived to measure similar hypotheses. The hypotheses regarding the MBTI and the LSI, which Kolb (1976) perceived to assess similar Jungian psychological types, included:

"... scores higher on Concrete Experience should use sensation as a mode of perceiving and feeling as a mode of judging. Abstract Conceptualizers should use intuition as a perceiving mode and thinking as a judging mode. Active Experimentation should be extroverts who use the sensation perceiving mode,

while Reflective Observers should be introverts who use the intuition perceiving mode" (p. 29).

The results of the correlations (see Appendix F) revealed some support for these hypotheses, but not consistently in all groups. Kolb (1976) conceded that "Jung's theory is not exactly congruent with experiential learning theory" (p. 29), a consideration which may have influenced the results of the correlations more than originally expected.

Testing the LSI for validity in a traditional manner is confounded by the method used to complete the inventory. Interdependency is created in the four learning modes when respondents are asked to rank-order which of the four items are most like them, third-most like them, second-most like them, and least like them. Kolb (1976) stated that "while group averages may yield statistically valid and replicable results by canceling out random situational and personal variation in scores, the accuracy of individual scores cannot be assured with a test that is theoretically based on dialectic interdependence of variables and on situational variability" (p. 13).

Validity for Kolb's LSI was reflected in correlational studies which examined only learning style inventories. Farrell (1983) completed a factor analysis on four learning style instruments; the Grasha-Riechmann Student Learning Style Scales (SLSS), the Kolb Learning Style Inventory (LSI), the Dunn Learning Style Inventory (LSI), and the Johnson Decision Making Inventory (DMI). The four factors for Kolb's 1976 LSI "had eigenvalues of 3.978, 1.765, 1.641, and 1.176 accounting for 46.5 percent, 20.6 percent, 19.2 percent, and 13.7 percent of the common factor variance, respectively" (p.35). Farrell reported the following learning-style domains assessed by the factor analysis: factor 1, abstract orientation; factor 2, active orientation; factor 3, passive orientation; and factor 4, concrete orientation. Farrell reported support for Kolb's conceptualization

of learning style, since the four factors extracted matched the four learning abilities as described by Kolb.

Similarly, Kotar (1980) reported support for the theoretical validity of Kolb's LSI. He stated that the "study has demonstrated that learning style classifications based on responses to the Learning Style Inventory are consistent with the Experiential Learning Model."

Statistical analyses were completed on the data in this study to test the validity of the LSI. Factor analysis procedures were utilized to identify the existence of a pattern among intercorrelations of the LSI sentence completions. It was expected that a pattern would emerge indicating the existence of four dominant learning style modes, or that, alternatively, two dominant factors would indicate the existence of two primary dimensions of learning hypothesized by Kolb (1976, 1984).

Eigenvalues for the four factors were 7.43, 6.05, 5.03, and 2.42, and accounted for 43.6 percent, 38.6 percent, 28.1 percent, and 15.5 percent of variance, respectively. The scree plot (see Figure 5) begins to trail off after the third eigenvalue. This may have indicated three significant factors rather than four.

The pattern of the factor analysis identified sentence completion correlations with three factors. A factor loading of  $\pm .5$  was considered salient. The results of the factor matrix indicated that the first factor was the active experimentation (AE) learning ability mode, the second factor was the reflective observation (RO) learning ability mode, and the third factor was the concrete experiences (CE) learning ability mode.

In view of the decade of ongoing use and research on the LSI, the reported validity, and the assessment of the adaptive modes in the learning process, the inventory

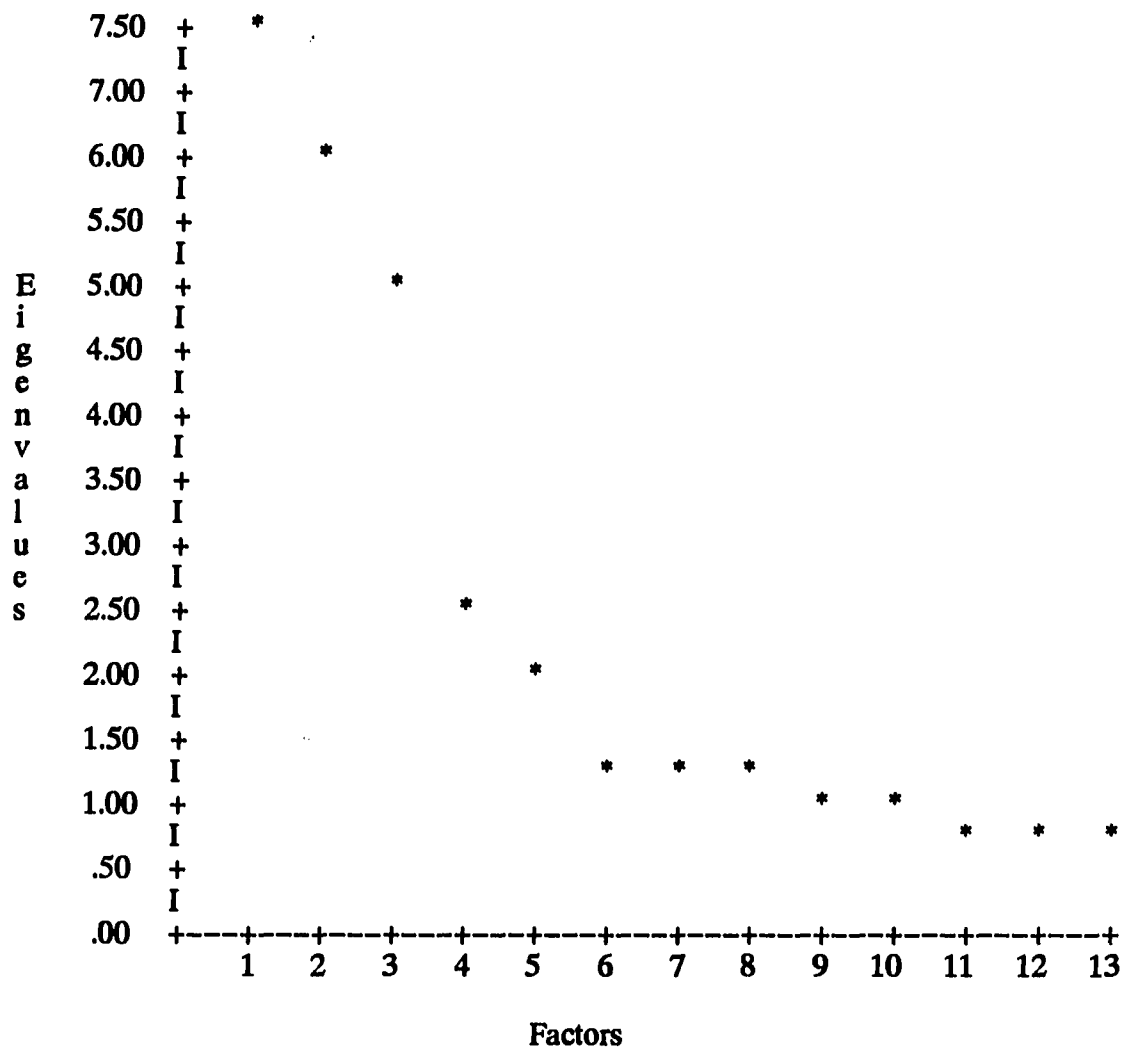


Figure 5: Scree Plot for LSI Factor Analysis

was considered suitable for the purpose of this study. The use of the LSI in this study was for the purpose of general inquiry and predictive application of students' learning styles, rather than for individual selection or diagnosis purposes.

**Reliability:** Some concern for the reliability of the LSI has been raised related to its test-retest reliability (Stumpf & Freedman, 1981 and Sims et al., 1986). Kolb (1981a) contends, however, that since the LSI is based on constructs that are

theoretically conceived of as situationally variable, split-half reliabilities are better than test-retest coefficients for the LSI. Kolb believes that for the measurement of fixed psychological traits, the test-retest is appropriate "for the assessment of measurement error in independent psychological traits that in theory are assumed to be fixed and unchanging. The basic learning modes assessed by the LSI, however, are theoretically interdependent (i.e., any action, including responding to the test, is determined in varying degrees by all four learning modes) and variable (i.e., the person's interpretation of situation should to some degree influence which modes are used)" (p. 291). Results of Kolb's split-half correlations between the current LSI and the old LSI averaged .81 (Appendix F).

Curry's (1983) findings concurred with Kolb's thesis that learning styles are influenced by situational factors and may change over time. She reported that test-retest results on the 1976 version of the LSI averaged .58, whereas internal consistency averaged .69 (pp. 20-21). Kotar (1980) also found evidence supporting the reliability of Kolb's LSI, reporting split-half coefficients of .74 (AE-RO) and .67 (AC-CE), and significantly negative correlations for opposing learning mode scores (AC and CE, AE and RO) (p. 85).

Statistical analyses were completed on the LSI for this study to seek evidence of its reliability. Patterns were expected to be detected in the manner in which sentence completions were rank-ordered and in intercorrelations between the sentence completions. The split-half reliability coefficients were calculated using the Spearman-Brown prophecy formula. The results for the learning ability modes were .74 for CE, .81 for RO, .82 for AE, and .84 for AE.

The split-half coefficients reported on the LSI are supportive of the inventory for use as a research tool for assessing individual learning styles. As reported in the literature, learning style inventories have demonstrated poor measurement qualities. The literature, however, refers to Kolb's LSI as a prominent theory-based learning style inventory.

In summary, both the validity and reliability of the LSI are confounded by several factors. The basic learning modes assessed by the LSI are not considered to be fixed and unchanging; they are theoretically interdependent and variable. The learning style modes are dialectically interdependent, are determined by variable situational factors and personal dispositions, and are sensitive to maturation or experience. Although these factors are problematic in assessing the reliability and reliability on the LSI, these factors contribute to the value of the inventory for assessing learning styles of the adult population in this study.

**Directions for the Learning Style Inventory:** Students were provided with the following directions for completing Kolb's LSI.

**Directions:** On the following page you will be asked to complete a number of sentences. Each has four endings. Rank the ending for each sentence according to how well you think each one fits with how you would go about learning something. Try to recall some recent situation where you had to learn something new. Then, using the space provided, rank a "1" for the sentence ending that describes how you learn best, down to a "4" for the sentence ending that seems least like the way you would learn. Be sure to rank all of the endings for each sentence unit. Please do not make ties. The following is an example of a completed sentence set:

When I learn:    \_\_\_ I am    \_\_\_ I am    \_\_\_ I am    \_\_\_ I am  
                         happy.    fast.    logical.    careful.

Please remember: Do not make ties, and rank as follows:  
1 = Most like you  
2 = Second most like you



3 = Third most like you  
4 = Least like you

These "directions" for completing the LSI provided to the adult students participating in this study were slightly modified by the researcher. In Kolb's LSI questionnaire, respondents are asked to place the number "4" next to the sentence ending which describes how they "learn best" and the number "1" next to the sentence ending which "seems least like the way" they would learn. For this study, respondents were asked to place the number "1" next to the sentence ending which describes how they "learn best" and the number "4" next to the sentence ending which "seems least like the way" they would learn. This change (recommended by one of the students participating in the pilot study) was made to facilitate clarity in completing this part of the questionnaire. Prior to analysis of the data, these rankings were converted to coincide with Kolb's (1985) scoring technique.

**Scoring the Learning Style Inventory:** The LSI yields six scores. They include four scores for the relative emphasis on each of the learning modes: concrete experience (CE), reflective observation (RO), active conceptualization (AC), and active experimentation (AE). In addition, two combination scores indicate the extent to which the individual emphasizes abstractness over concreteness (AC–CE) and action over reflection (AE–RO).

Each learning mode score is calculated by adding the learning mode column scores for each of the 12 simple sentences. The combined scores are established by subtracting the scores of the diametrically opposed learning modes of AC (abstract) from CE (concrete) for the AC–CE primary dimension score and by subtracting the AE (active) from RO (reflective) for the AE–RO primary dimension score. Kolb (1985)

reported that, from the combined scores, an individual can be placed into one of four learning style types: diverger, assimilator, converger, or accommodator.

In addition, this research explored the dominance levels of the learning style types. For the purpose of this study, the group mean scores for AC-CE and AE-RO were used to identify the sample-based midpoint for the learning style dominance levels. The group mean score for AC-CE was 5.20, with a standard deviation of 11.732, and the AE-RO group mean score was 1.16, with a standard deviation of 12.24. Standard deviations were used to determine the following five levels of dominance: "balanced," "moderately balanced," "non-determinant," "moderately dominant," and "dominant." These levels were determined by using set intervals of one half standard deviation above and below the group mean scores (see Table 2 below). The "balanced learning style" consisted of those scores which were one-half standard deviation above and below the group mean score, the "moderately balanced learning style" consisted of scores which were within one-half to one standard deviation above and below the group mean score,

**Table 2. Standard Deviation Intervals for Levels of Learning Style Dominance**

<b>Learning Styles Mean Score</b>	<b>Subjects' Score in Relation to Group</b>
Balanced	1/2 standard deviation above and below
Moderately Balanced	1 to 1/2 standard deviation above and below
Non-determinant	1 to 1 1/2 standard deviation above and below
Moderately Dominant	1 1/2 to 2 standard deviation above and below
Dominant	2 standard deviations above and below

the "non-determinant learning style" consisted of scores which were within one to one and one-half standard deviation above and below the group mean scores, the "moderately dominant learning style" consisted of scores which were within one and one-half and two standard deviations or more above and below the group mean scores, and the "dominant learning style" consisted of scores which were two standard deviations above and below the group mean scores.

### **Demographic Items**

The final section of the questionnaire was devoted to a set of demographic characteristics. Among them were gender, age, marital status, parental/guardian responsibilities, employment patterns, year in college, course load, major, class times, travel distance to campus, and matriculation pattern (see Appendix D). There are two main reasons for their use. First, they provide a description of the sample and the population characteristics represented by the sample. Not only is this of interest in itself, but it also allows for a comparison with the larger population. Second, the demographic characteristics are very important when examining the attitudes and behaviors which are a focus of this study. Often persons of different backgrounds -- such as age, employment situations, year in college -- have different attitudes and behavior patterns. For this study, knowing these differences was expected to help to explain barriers to learning in relation to learning style preferences and to predict future patterns.

### **Sampling Plan**

It was calculated that a sample of 320 students would be required in order to

assess the findings at the 95% confidence level, with a sampling error range of + and – 5%. Based upon the pilot study return rate of 45.0%, the decision was made to sample approximately 54% of the remaining number (1,489) of the students in the universe under study. A systematic random sampling plan was used to select these students.

### **Data Gathering Procedures**

Prior to receiving a list of all undergraduate students 25 years or older enrolled at UNI from the UNI Registrar's Office, approval was obtained from the ISU Human Subjects in Research Review Committee and from the UNI Institutional Review Board (Appendix A). From this list, 60 students were selected to receive the pilot study questionnaire and 800 were selected to receive the questionnaire for the formal phase of the study. On April 21, 1989, the questionnaires (Appendix D) and personal cover letters (Appendix C) were mailed. The personal letter explained the study and requested that recipients complete and return the research instrument in the postage-paid envelope. Subjects were also informed that no identification system would be used and, therefore, their responses were anonymous. A follow-up letter to the subjects was not sent to the subjects who received questionnaires, as a 43.0% response rate was attained two weeks after the questionnaires were mailed.

Since the questionnaire used in the formal phase of the study did not involve any major content changes, the 60 subjects from the pilot study were included in the final analysis of the data. The 860 mailed questionnaires resulted in 435 (50.58%) returns. A final sample of 431 was included for analysis. Two of the mailings could not be forwarded, one graduate student returned an unfinished questionnaire, and one 24-year-old subject was eliminated.

### **Subjects**

Subjects for this study were undergraduate adult students at the University of Northern Iowa, with an average age of 34 years. More than 50% were female (66.6%), married (54.1%), or with children living at home (57.1%). Fifty-eight percent were employed either full-time or part-time outside the home during their educational pursuits. The sample was almost evenly divided between part-time (52.2%) and full-time (47.8%) students, with the majority being seniors (44.9%) and juniors (22.8%). Those students who had previously been enrolled in a college (68.9%) had attended for an average of 2.5 years, with an average of 9.5 years since they had last attended a college. Adult students were more frequently on campus in the morning (44.5%) than in the afternoon (30.8%), in the evening (22.0%), or on Saturday (.6%). A summary of the demographic information is included in Appendix D.

### **Statistical Analysis of Findings**

The techniques used in the analysis of the data consisted of two basic procedures. First, frequencies of responses were calculated for each item. The second procedure included assessing relationships among the relevant variables through inferential statistics.

The t-test for paired observations, used to test hypothesis 1, examined differences in the dispositional, situational, and institutional barriers scores.

To test hypothesis 2, an analysis of variance (ANOVA) one-way classification was used to examine whether differences among the means of the three barrier dimensions were significantly related to classification.

To test hypothesis 3, the Pearson product-moment correlation coefficient was used

to measure the linear relationship between dispositional barrier scores and age.

To test hypothesis 4 an analysis of variance (ANOVA) one-way classification was used to examine the differences among the means of dispositional barriers and balanced and dominant learning styles.

To test hypothesis 4, the t-test for paired observations was used to test whether there was statistical significance among the means of the dispositional, situational, and institutional barriers' scores for students with dominant learning styles.

The t-test for paired observations was used to test hypothesis 5 to examine whether there was statistical significance among the three barrier dimension mean scores for students with balanced and dominant learning styles.

To test hypothesis 6, chi-square was used to test for differences in the proportions of juniors and seniors and the proportion of freshmen and sophomores with balanced learning styles.

## **CHAPTER IV.**

### **ANALYSIS OF THE FINDINGS**

#### **Introduction**

The purpose of this chapter is to present the findings of this research study. Using the causal-comparative design, this study was designed to examine the relationship of perceived barriers to learning and learning styles of adult students in higher education.

The dependent variable, barriers to learning, was assessed using the Barriers to Learning Index. Kolb's Learning Style Inventory was used to assess the independent variable, learning style preference.

This chapter will discuss the findings of each of the statistical analyses applied to the six hypotheses. The primary statistical analyses were the t-test for paired observations, one-way analysis of variance, Pearson correlation coefficient, and chi-square. Results concerning the measurements will be presented first, followed by demographic information, and concluding with statistical analysis.

#### **The Measurements**

##### **Barriers to Learning Index**

The Barriers to Learning Index consisted of 43 statements, of which 15 measured the dispositional barriers dimension, 14 the institutional barriers dimension, and 14 the situational barriers dimension (Appendix E). Subjects responded to each statement using a 7-point Likert scale indicating the extent to which the statement was a problem for them as they pursued their university education. The mean score for each statement was calculated from the response of each subject.

Table 3. Items for Barriers to Learning with Highest and Lowest Mean Scores and their Dimensions

Barriers to Learning	Dimensions <sup>a</sup>	Mean Score (N=431)
<b>HIGHEST MEANS</b>		
Availability of campus parking	I	5.05
Cost of books, supplies, and fees	S	4.49
Cost of tuition	S	4.41
Time to spend with family	S	4.39
Time for social activities	S	4.38
Classes available at convenient times	I	4.25
Enough time for assignments and studying	S	4.07
Job responsibilities	S	4.01
Stress in classes and studying	D	3.97
Anxiety when taking tests	D	3.80
Family understands demands as a student	S	3.78
Getting registered for classes	I	3.70
Amount of work classes require	D	3.67
Time for my job	S	3.66
<b>LOWEST MEANS</b>		
Paying cost of child care	S	2.70
Not enough time to complete exams	D	2.69
How I am graded	D	2.68
Application of subject matter in classes	I	2.67
Travel distance to campus	S	2.61
What is important to learn	D	2.59
Feeling confident as a student	D	2.57
Classes stimulate learning	I	2.57
Having competent child care	S	2.47
Being accepted by younger students	D	2.35
Concentration in classes	D	2.23
Uneasy visiting with instructors	D	2.16
Showing ambition in classes	D	2.13
Being accepted as a student by instructors	D	1.78

<sup>a</sup>D = dispositional, I = institutional, S = situational.



Table 3 above lists the most and least problematic barriers to learning for the subjects in this study. Only three of the 15 dispositional barriers were identified as problematic barriers; whereas nine of the 15 were considered least problematic, as shown in Table 4 below.

Table 4 below reveals the mean scores for each from the three dimensions of the Barriers to Learning Index for the adult students participating in this study.

**Table 4. Barriers to Learning Index Means Scores**

<b>Barrier Dimensions</b>	<b>n</b>	<b>Mean Score</b>
Situational	431	3.64
Institutional	431	3.30
Dispositional	429	2.81
Total Barrier Index	431	3.23

### **The Learning Style Inventory**

**Table 5. Means and Standard Deviations for Learning Modes and Combination Scores on the Learning Style Inventory**

<b>Learning Modes and &amp; Combinations</b>	<b>n</b>	<b>Mean</b>	<b>Standard Deviation</b>
Concrete Experience	426	25.77	6.858
Reflective Observation	425	31.09	7.242
Abstract Conceptualization	425	30.94	7.515
Active Experimentation	431	33.19	10.838
AC - CE	425	5.20	11.732
AE - RO	425	1.16	12.248

The LSI consists of 12 simple sentence-completion items and involves rank-ordering, from one to four, four sentence endings in a manner which best described adult students' learning style preferences. The LSI yielded six scores. One score was given for each of the four learning mode scores and two for the combination scores. Table 5 above shows the mean scores and standard deviations for the learning modes and combined scores for this study.

The combined scores were used to plot the sample-based data point, or point of intersection, to establish the learning style preference and the levels of dominance for each learning style. Table 6 shows the frequency and percent for the learning style preference categories for the subjects in this study.

**Table 6. Frequency and Percent for Learning Style Preference Categories**

<b>Learning Style Preference Category</b>	<b>Frequency (n=425)</b>	<b>Percent</b>
Diverger	111	25.8
Assimilator	106	24.6
Converger	97	22.5
Accommodator	111	25.8

Utilizing the two combined scores, AC-CE and AE-RO, a data point was located in one of five levels of dominance. Table 7 shows the frequency and percent for the levels of dominance of the subjects included in this study.

**Table 7. Frequency and Percent of the Five Levels of Learning Style Dominance**

<b>Levels of Dominance</b>	<b>Frequency (n=425)</b>	<b>Percent</b>
Balanced	46	10.7
Moderately Balanced	139	32.3
Non-determinant	133	30.9
Moderately Dominant	75	17.4
Dominant	32	7.4

The intent of this study was to examine the difficulties of the perceived barriers to learning in relation to learning style levels of dominance. Table 8 presents a summary of the mean scores for each of the three barriers to learning dimensions for the five learning style levels of dominance.

**Table 8. Mean Scores for the Learning Style Dominance by Barrier Dimensions**

<b>Levels of Dominance</b>	<b>Barrier Dimensions</b>		
	<b>Dispositional (n=425)</b>	<b>Institutional (n=425)</b>	<b>Situational (n=423)</b>
Balanced	2.77	3.22	3.75
Moderately Balanced	2.77	3.11	3.45
Non-determinant	2.86	3.37	3.70
Moderately Dominant	2.84	3.50	3.71
Dominant	2.80	3.43	3.84

### **Hypothesis 1**

"The dispositional barrier scores will be statistically higher than either institutional or situational barrier scores." To evaluate this research hypothesis, a t-test for paired observations was used.

As shown in Table 9, the dispositional barriers mean score (2.81) is lower than either the institutional (3.30) or situational (3.64) barrier mean score. The differences between these three barrier dimension mean scores are statistically significant ( $p=.000$ ). The difference, however, is the reverse of what was hypothesized. Therefore, the research hypothesis that dispositional barrier mean scores will be statistically higher than either institutional or situational barriers was not supported.

**Table 9. Summary of t-test for Barrier Dimension Mean Scores**

<b>Barrier Dimension</b>	<b>n</b>	<b>Mean Score</b>	<b>T Value</b>	<b>Significance (p= )<sup>a</sup></b>
<b>Dispositional</b>	<b>431</b>	<b>2.81</b>		
<b>Institutional</b>	<b>431</b>	<b>3.30</b>	<b>- 9.95</b>	<b>.000</b>
<b>Dispositional</b>	<b>431</b>	<b>2.81</b>		
<b>Situational</b>	<b>429</b>	<b>3.64</b>	<b>-14.46</b>	<b>.000</b>
<b>Institutional</b>	<b>431</b>	<b>3.30</b>		
<b>Situational</b>	<b>429</b>	<b>3.64</b>	<b>- 6.11</b>	<b>.000</b>

<sup>a</sup>Two-tailed significance.

### **Hypothesis 2**

"All three barrier dimension scores will be statistically higher for freshmen and sophomores than for juniors and seniors." To evaluate this research hypothesis, a one-

way analysis of variance was used.

Table 10 provides a summary of the analysis of variance tests for this hypothesis. The results indicate no significant difference between the mean scores for the three barrier dimensions for the two classification groups under study.

**Table 10. Summary of Mean Scores and F-ratios for Grouped Classification by Barrier Dimensions**

Student Classification	Barrier Dimensions Mean Scores		
	Dispositional (n=427)	Institutional (n=427)	Situational (n=425)
Freshman-Sophomore	2.95	3.24	3.62
Junior-Senior	2.79	3.36	3.45
Unclassified	2.59	2.85	3.45
F-ratio	1.943	2.769	.398
p=	.145	.064	.672

To examine whether any meaningful distinctions could be ascertained by separating the classification groups by year in college, the same analysis was done by each grade level. As shown in Table 11 below, no significant differences exist between the mean scores for these four groups by this grouping.

There is no statistically significant difference between the three barrier dimension mean scores for freshmen and sophomores as compared to juniors and seniors. Therefore, the research hypothesis that all three barrier dimension scores will be

statistically higher for freshmen and sophomores than for juniors and seniors is not supported.

**Table 11. Summary of Mean Scores and F-ratios for Classification by Barrier Dimensions**

Student Classification	n	Barrier Dimension Mean Scores		
		Dispositional (n=427)	Institutional (n=427)	Situational (n=425)
Freshman	42	3.21	3.21	3.61
Sophomore	68	2.79	3.26	3.62
Junior	98	2.77	3.42	3.63
Senior	191	2.80	3.33	3.69
Unclassified	28	2.59	2.85	3.45
F-ratio		2.293	1.489	.227
p=		.059	.205	.924

### Hypothesis 3

"All three barrier scores will be statistically higher for younger adult students than for older adult students." To evaluate this research hypothesis, the strength of the relationship between each of the three barrier dimension scores and age was examined using Pearson's correlation coefficient.

The results show (see Table 12 below) a moderately weak negative correlation between each of the barriers to learning dimensions and age. To further determine the distinctions of the three barrier dimension mean scores and age, ages were grouped into

three categories. The categories are consistent with the age groupings Kolb has used to norm the LSI scores.

**Table 12. Pearson Correlation Coefficients for Barrier Dimension Scores with Age**

<b>Barrier Dimensions</b>	<b>n</b>	<b>Correlation Coefficient</b>	<b>Significance (p= )<sup>a</sup></b>
<b>Dispositional</b>	<b>428</b>	<b>-.1443</b>	<b>.002</b>
<b>Institutional</b>	<b>428</b>	<b>-.1773</b>	<b>.009</b>
<b>Situational</b>	<b>426</b>	<b>-.1973</b>	<b>.000</b>

<sup>a</sup>One-tailed significance.

**Table 13. Summary of Mean Scores and F-ratios for Age Groups and Barrier Dimension Scores**

<b>Age Groups</b>	<b>n</b>	<b>Barrier Dimension Mean Scores</b>		
		<b>Dispositional (n=428)</b>	<b>Institutional (n=428)</b>	<b>Situational (n=426)</b>
<b>25-34</b>	<b>245</b>	<b>2.91</b>	<b>3.36</b>	<b>3.79</b>
<b>35-45</b>	<b>154</b>	<b>2.73</b>	<b>3.33</b>	<b>3.59</b>
<b>46 or older</b>	<b>29</b>	<b>2.53</b>	<b>2.75</b>	<b>2.75</b>
<b>F-ratio</b>		<b>3.171</b>	<b>3.841</b>	<b>9.415</b>
<b>p=</b>		<b>.043</b>	<b>.022</b>	<b>.000</b>

There was a statistically significant correlation between each of the three barrier dimension mean scores and age. That is, as age increases barriers decrease. Therefore, the research hypothesis that all three barrier dimension mean scores will be statistically higher for younger students than older students was supported. However, given the small amount of variance accounted for by age, the practical significance of this result is minimal.

#### **Hypothesis 4**

"Students with dominant learning styles will have higher dispositional barrier scores than either situational or institutional barrier scores." To evaluate this research hypothesis a t-test for paired observations was used.

**Table 14. Summary of t-test for Dominant Learning Styles by Barrier Dimensions**

<b>Dominant Learning Style</b>	<b>n</b>	<b>Mean Score</b>	<b>T Value</b>	<b>Significance (p= )<sup>a</sup></b>
<b>Dispositional Institutional</b>	<b>32</b>	<b>2.80 3.44</b>	<b>-3.12</b>	<b>.004</b>
<b>Dispositional Situational</b>	<b>32</b>	<b>2.80 3.84</b>	<b>-4.43</b>	<b>.000</b>
<b>Institutional Situational</b>	<b>32</b>	<b>3.44 3.84</b>	<b>-1.97</b>	<b>.057</b>

<sup>a</sup>Two-tailed significance.

The results indicate (Table 14, above) a significant difference between dispositional barrier and institutional barrier mean scores, and between dispositional and situational



barrier mean scores for students with dominant learning styles. The difference, however, is the reverse of what was hypothesized. The dispositional barrier mean score is lower than either of the others.

Although there is a statistically significant difference between the dispositional barrier scores and both the institutional and situational barrier mean scores, this difference is the reverse of what was hypothesized. Therefore, the research hypothesis that students with dominant learning styles will have higher dispositional barrier scores than either institutional or situational barrier scores was not supported.

#### Hypothesis 5

"Students with balanced learning styles will have lower dispositional barrier scores than students with dominant learning styles." To evaluate this research hypothesis, a t-test for paired observations was used.

**Table 15. Summary of t-test for Balanced and Dominant Level Learning Styles by Barrier Dimensions**

Barrier Dimensions	n	Mean Score	T Value	Significance (p= )
<b>DISPOSITIONAL</b>				
Balanced	46	2.77		
Dominant	32	2.80	0.14	.887
<b>INSTITUTIONAL</b>				
Balanced	46	3.22		
Dominant	32	3.43	0.72	.475
<b>SITUATIONAL</b>				
Balanced	46	3.75		
Dominant	32	3.84	0.26	.795

Table 15 shows that dispositional barrier mean scores for adult students with a balanced learning style are lower than for those with a dominant learning style. Likewise, this direction of difference holds for institutional and situational barrier scores. These differences, however, are not statistically significant. Consequently, the research hypothesis that students with balanced learning styles will have lower dispositional barrier scores than will students with dominant learning styles was not supported.

### Hypothesis 6

"Proportionately more junior and senior students will have balanced learning style scores than will freshmen and sophomore students." Chi-square was used to evaluate this research hypothesis.

The results of the analysis reveal no significant difference ( $\chi^2=.059$ ,  $p=.810$ ) between the proportion of juniors and seniors with balanced learning styles and the proportion of freshmen and sophomores with balanced learning styles.

Table 16. Summary of Chi-square for Levels of Dominance by Classification

Levels of Dominance	n	Percent	
		Freshmen-Sophomores (n=109)	Juniors-Seniors (n=285)
Balanced	44	10.1	11.6
Not Balanced	350	89.9	88.4
$(\chi^2=.059, p=.810)$			

Therefore, the research hypothesis that proportionally more junior and senior students will have balanced learning style scores than will freshmen and sophomore students was not supported.

### **Additional Analyses**

In an attempt to ascertain why the research hypotheses may not have been supported as projected, additional analyses were done. These analyses were examined to see if any demographic variables had a role to play in how the results turned out.

### **Barriers to Learning**

As shown in Tables 12 and 13, all three barrier dimensions were reportedly less problematic for older adult students than for younger adult students. As shown in Table 17 below, there is a significant negative correlation between all three barrier dimensions and elapsed years since last attending a college. The three barrier dimension mean scores are significantly lower as the years since last attending a college increase.

**Table 17. Pearson Correlation Between Barrier Dimensions and Elapsed Time Since Last Attending a College**

Correlation Coefficients of Elapsed Years	Barrier Dimension Mean Scores		
	Dispositional (n=422)	Institutional (n=422)	Situational (n=421)
Coefficients	-.1212	-.1249	-.1093
p=	.036	.032	.006

These two findings suggest that there is an interdependent relationship between age and number of years since last attending a college. Consequently, it could be conjectured that as students mature they are more likely to have developed adaptive skills that allow them to more quickly and easily adapt to the learning environment.

Several demographic variables were significantly related to either one or two barrier dimensions. The demographic variables which showed a significant relationship with one or all of the barrier dimensions are presented in the following.

Dispositional barriers: Other than age and elapsed time since last attending a college, the demographic variables which showed a significant relationship between dispositional barrier mean scores were marital status, credit hours, and major by college.

**Table 18. Summary of Mean Scores and F-ratios for Single and Married Status by Barrier Dimensions**

		Barrier Dimension Mean Scores		
		Dispositional (n=430)	Institutional (n=430)	Situational (n=428)
Marital Status	n			
Single	197	2.95	3.37	3.62
Married	233	2.71	3.25	3.65
F-ratio		6.850	1.016	.066
p=		.009	.314	.798

There was a significant difference ( $p=.009$ ) between dispositional barrier mean scores of married adult students and single adult students. As shown above in Table 18, dispositional barriers were less problematic for adult students who were currently married than for all the single adult students.

To see if there were any meaningful distinctions by separating marital status into its constituent categories, the same analysis was done for each of the four categories. The results of this analysis, provided below in Table 19, showed that dispositional barrier mean scores were lower for married adult students (2.71) than for adult students who were never married (2.94), separated/divorced (2.95), or widowed (3.02). None of these differences, however, was statistically significant.

**Table 19. Summary of Mean Scores and F-ratios for Marital Status by Barrier Dimensions**

Marital Status	n	Barrier Dimension Mean Scores		
		Dispositional (n=430)	Institutional (n=430)	Situational (n=428)
Never Married	115	2.94	3.40	3.48
Married	233	2.71	3.25	3.65
Separated-divorced	75	2.95	3.29	3.85
Widowed	7	3.02	3.66	3.55
F-ratio		2.289	.638	1.368
p=		.078	.591	.252

There was a significant difference ( $p=.032$ ) between dispositional barrier mean scores (Table 20 below) and the college of adult students majors.

Since the subjects in this study represented many different majors, the researcher categorized the majors into nine areas. These areas are organized by the academic structure of UNI. The nine areas are five colleges (College of Education, College of

**Table 20. Summary of Mean Scores and F-ratios for College of their Major by Barrier Dimensions**

College	n	Barrier Dimension Mean Scores		
		Dispositional (n=430)	Institutional (n=430)	Situational (n=428)
College of Business	90	3.06	3.49	3.84
College of Education	86	2.61	3.20	3.58
College of Social Behavioral Sciences	48	2.65	3.54	3.83
College of Natural Sciences	74	3.00	3.48	3.80
College of Humanities & Fine Arts	49	2.91	3.12	3.55
Division of Continuing Education	33	2.81	3.52	3.30
Pre-professional	34	2.65	2.62	3.49
F-ratio		2.223	3.817	1.573
p=		.032	.001	.142

Humanities and Fine Arts, College of Natural Sciences, College of Social and Behavioral Sciences, and College of Business), the Division of Continuing Education (Liberal Studies and General Studies), and pre-professional programs in areas such as law, veterinary medicine, and nursing.

Adult students with majors in three different colleges reported dispositional barriers to be more problematic than students with majors in the other colleges. Those reporting the most difficulty with dispositional barriers were students with majors in the College of Business (3.06), College of Natural Sciences (3.00), and the College of Humanities and fine arts (2.91). Students who reported dispositional barriers to be the least problematic were students with majors in the College of Education (2.61), College of Social and Behavioral Sciences (2.65), and students in pre-professional programs (2.65).

Table 21. Summary of Mean Scores and F-ratios for Full-time and Part-time Student Status by Barrier Dimensions

Credit Hours	n	Barrier Dimension Mean Scores		
		Dispositional (n=429)	Institutional (n=429)	Situational (n=427)
Part-time	225	2.69	3.28	3.50
Full-time	204	2.95	3.34	3.79
F-ratio		8.175	.268	5.613
p=		.005	.605	.018

There was a significant difference ( $p=.005$ ) between dispositional barrier mean scores for part-time (2.69) and full-time (2.95) adult students. Table 21 above shows that dispositional and situational barriers were more of a problem for full-time adult students than for part-time adult students.

**Institutional barriers:** In addition to age and elapsed years since last attending a college, two other demographic variables showed a significant relationship with institutional barrier mean scores. These were the college of their major and their employment status.

Institutional barrier mean scores were significantly related ( $p=.001$ ) to the college of their major, as shown above in Table 20. Students with majors in four different colleges reported institutional barriers to be more problematic than did majors in the other colleges. Those reporting the most problematic institutional barriers were adult

**Table 22. Summary of Mean Scores and F-ratios for Employed and Not Employed by Barrier Dimensions**

Employment Status	n	Barrier Dimension Mean Scores		
		Dispositional (n=420)	Institutional (n=420)	Situational (n=418)
Employed	248	2.75	3.42	3.65
Not Employed	172	2.92	3.15	3.61
F-ratio		3.154	5.552	.146
p=		.077	.019	.702



students with majors in the College of Social and Behavioral Sciences (3.54), Division of Continuing Education (3.52), the College of Business (3.49), and the College of Natural Sciences (3.48). Those who reported institutional barriers being less problematic were adult students with pre-professional programs (2.62), College of Humanities and Fine Arts (3.12), and the College of Education (3.20).

Table 22 above shows a significant difference ( $p=.019$ ) between the institutional barrier mean scores of adult students who were employed outside the home either full-time or part-time and those who were not employed outside the home, unemployed, or retired. The institutional barrier mean score for those who were employed outside the home (3.42) was higher than the institutional barrier mean scores for those who were not employed outside the home, unemployed, or retired (3.15).

Situational barriers: Other than age and the elapsed time since last attending a college, the demographic variables showing a significant relationship with situational barrier mean scores were children in the home, travel distance to campus, and credit hours.

There was a significant difference ( $p=.000$ ) between the situational barrier mean scores for adult students who had children living at home and those who did not have children living at home, as shown below in Table 23. Adult students with children living at home showed situational barriers to be more profound than did students who did not have children living at home.

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**Table 23. Summary of Mean Scores and F-ratios for Children Living at Home by Barrier Dimensions**

Children at Home	n	Barrier Dimension Mean Scores		
		Dispositional (n=420)	Institutional (n=420)	Situational (n=418)
Yes	246	2.77	3.29	3.86
No	172	2.90	3.32	3.36
F-ratio		2.044	.091	16.276
p=		.154	.763	.000

**Table 24. Summary of Mean Scores and F-ratios for Travel Distance by Barrier Dimensions**

Travel Distance	n	Barrier Dimension Mean Scores		
		Dispositional (n=421)	Institutional (n=421)	Situational (n=419)
1 Mile or Less	87	2.95	3.81	3.54
2 to 3 Miles	80	2.79	3.13	3.40
4 to 6	37	2.78	3.30	3.53
7 to 9	35	2.98	3.12	3.64
10 to 19	93	2.78	3.37	3.59
20 or More	89	2.72	3.44	4.06
F-ratio		.767	.920	2.836
p=		.574	.468	.016

There was a significant difference ( $p=.016$ ) between the situational barrier mean scores related to the distance students travelled to campus, as shown in Table 24. Students who travelled more than 20 miles to campus reported the most problematic situational barrier mean scores. Situational barriers were the least problematic for adult students who travelled two to three miles to campus.

When examining the credit hours of the adult students, there was a significant difference ( $p=.018$ ) between situational barrier mean scores for part-time (3.50) and full-time adult students (3.79), as shown in Table 21 above. Full-time students reported situational barriers being more problematic than did part-time students.

There was a significant relationship between two of the demographic variables, namely, age and years since last attending a college, and barriers to learning. Therefore, a step-wise regression analysis was undertaken to assess whether there are combinations of demographic variables which have a combined predictive capability with the three barrier dimensions. It was found that 18 percent of the variance in situational barriers was explained by whether respondents had children living at home and the number of years since last attending a college.

#### **Learning Style Types and Demographic Variables**

Kolb's LSI has been primarily utilized to identify individuals' preferred learning style. The purpose of this study, however, was to examine levels of dominant versus balanced learning styles and whether these are related to barriers to learning. Additional analysis on preferred learning styles was pursued to further analyze the universe under study.

Adult students tended to be accommodators (25.8%) and divergers (25.8%), more than they were convergers (22.8%), as shown above in Table 6.

Chi-square was used to examine the relationship of gender, age, college of the major, classification, and the barriers to learning dimensions with learning style preferences. The three demographic variables which were significantly related to learning style preferences were gender, year in college, and major by college.

There was a significant ( $\chi^2=20.540$ ,  $p=.000$ ) relationship between the gender of adult students and their learning style types. Table 25 below shows that women students tended to be accommodators (31.1%) or divergers (27.6%), whereas men tended to be assimilators (35.2%) or convergers (28.9%).

Table 25. Summary of Chi-square for Learning Style Types by Gender

Learning Style Types	n	Percent	
		Female (n=109)	Male (n=285)
Accommodator	111	31.1	16.2
Diverger	106	27.6	19.7
Assimilator	111	21.6	35.2
Converger	<u>97</u>	<u>19.8</u>	<u>28.9</u>
Totals	425	100.1 <sup>a</sup>	100.0
$(\chi^2=20.540, p=.000)$			

<sup>a</sup>Rounding errors account for some differences from 100%.

There was a significant relationship ( $\chi^2=36.412$ ,  $p=.020$ ) between the four learning style types and the college of the adult students' major. Table 26 shows the proportion

of adult students by college of their major and their learning style preference. Adult students with majors in the College of Education tended to be accommodators; those with majors in the College of Social and Behavioral Sciences, College of Humanities and Fine Arts, and the Division of Continuing Education tended to be divergers; and students with majors in the College of Social and Behavioral Sciences, College of Natural Sciences, and pre-professional programs tended to be assimilators; and students in the College of Business tended to be convergers.

Table 26. Summary of Chi-square for Learning Style Types by College of Their Major

Learning Style Type	n	Percent						
		BUS <sup>a</sup> (89) <sup>b</sup>	COE (85)	S&B (48)	NSC (73)	HUM (48)	CTG (33)	PRO (7)
Accommodator	106	21.3	36.5	22.9	19.2	22.9	24.2	24.2
Diverger	104	21.3	31.8	31.3	12.3	29.2	30.3	27.3
Assimilator	109	23.6	21.2	29.2	35.6	25.0	21.2	30.3
Converger	97	33.7	10.6	16.7	32.9	22.9	24.2	18.2
Totals	416	99.9 <sup>c</sup>	100.1 <sup>c</sup>	100.1 <sup>c</sup>	100.0	100.0	99.9 <sup>c</sup>	100.0

( $\chi^2=36.412$ ,  $p=.020$ )

<sup>a</sup>BUS, College of Business; COE, College of Education; S&B, College of Social and Behavioral Sciences; NSC, College of Natural Sciences; HUM, College of Humanities and Fine Arts; CTG, Division of Continuing Education; PRO, Pre-professional programs.

<sup>b</sup>n.

<sup>c</sup>Rounding errors account for some differences from 100%.

Table 27 below shows a significant relationship ( $\chi^2=16.958$ ,  $p=.050$ ) between classification and learning style types. Proportionately more freshmen (31.7%) and sophomores (35.3) tended to be assimilators, juniors (34.4%) tended to be accommodators, and seniors tended to be assimilators (27.0%) or convergers (27.5).

Table 27. Summary of Chi-square for Learning Style Types by Classification

Learning Style Types	n	Percent			
		Freshmen (n=41)	Sophomores (n=68)	Juniors (n=96)	Seniors (n=189)
Accommodator	101	24.4	19.1	34.4	23.8
Diverger	98	26.8	32.4	25.0	21.7
Assimilator	105	31.7	35.3	17.7	27.0
Converger	<u>90</u>	<u>17.1</u>	<u>13.2</u>	<u>22.9</u>	<u>27.5</u>
Totals	394	100.0	100.0	100.0	100.0
$(\chi^2=16.958, p=.050)$					

Proportionately more students between the ages of 25 and 34 were assimilators (30.6%), those between the ages of 35 and 45 were accommodators (32.5%), and those over 46 years of age were accommodators (31.0%) or divergers (31.0%), as shown in Table 28 below.

Table 28. Summary of Chi-square for Learning Style Types by Age

Learning Style Types	n	Percent		
		25-34 Years (n=242)	35-45 Years (n=151)	46 and Older (n=29)
Accommodator	111	21.9	32.5	31.0
Diverger	104	23.1	25.8	31.0
Assimilator	110	30.6	20.5	17.2
Converger	97	24.4	21.2	20.7
Totals	422	100.0	100.0	99.9 <sup>a</sup>

( $\chi^2=10.003$ ,  $p=.1245$ )

<sup>a</sup>Rounding errors account for some differences from 100%.

Table 29. Summary of Mean Scores and F-ratios for Learning Style Types by Barrier Dimensions

Learning Style Types	n	Barrier Dimension Mean Scores		
		Dispositional (n=425)	Institutional (n=425)	Situational (n=423)
Accommodator	111	2.82	3.33	3.71
Diverger	106	2.82	3.21	3.66
Assimilator	111	2.66	3.30	3.48
Converger	97	2.96	3.36	3.70
F-ratio		1.667	.353	.760
p=		.174	.787	.517

Table 29 above shows the least and most problematic barriers for the preferred learning style types. Dispositional and situational barriers were reported to be the least problematic for assimilators. Divergers had less difficulty with institutional barriers than did the other learning styles, whereas dispositional and institutional barriers were the most problematic for convergers. Situational barriers were the most problematic for accommodators and convergers.



## **CHAPTER V.**

### **SUMMARY, DISCUSSION, IMPLICATIONS, RECOMMENDATIONS, AND CONCLUSIONS**

#### **Introduction**

**This chapter summarizes the study and discusses the results of this study. It concludes with recommendations for future research in this area of study.**

#### **Summary of the Study**

**The purpose of this study was to examine the relationship between learning style preferences of adult students in higher education and barriers to learning. This study was conducted at the University of Northern Iowa (UNI) in the spring of 1989. The universe of the study consisted of all undergraduate students who were enrolled at UNI and were 25 years old or older at the time of the study. The total enrollment at UNI at the time of this study was 11,470. Among this number, 10,515 were undergraduate students, of whom 1,549 (14.7%) were 25 years old or older.**

**The systematic random sample of 860 adult students was drawn from the UNI Registrar's list of current undergraduate students 25 years old or older. The 860 mailed questionnaires resulted in 435 (51%) returns. A final sample of 431 was included for analysis.**

**The study used the Barriers to Learning Index developed by the researcher and guided by a conceptual framework of "dispositional," "institutional," and "situational" barriers categories derived by Cross (1978, 1986) to examine barriers to learning. The Learning Style Inventory (LSI) developed by Kolb (1985) was used to examine adult students' perceived barriers to learning. A three-part questionnaire was mailed to the**

sample on April 21, 1989. The first part of the questionnaire assessed perceived barriers to learning, and the second part included Kolb's 1985 version of the LSI to assess learning style preferences. The final part of the questionnaire consisted of demographic questions.

The review of literature revealed a lack of theoretically-based research for studying barriers to learning. Studies related to barriers to learning have applied traditional survey methodologies with varied patterns of analysis and reporting formats. In particular, the studies were lacking in an explanation and understanding of dispositional barriers. Kolb's experiential learning theory, based on his concept of growth and development, was viewed as a useful link between the problems adult students face in their academic endeavors and their abilities to cope with these problems.

The study was based on two conjectures: 1) if adult students perceive that their educational goals and needs are not congruent with those of the institution of higher education, they will experience difficulties in their educational pursuits, and 2) if adult students have balanced learning styles, they will be better able to adapt to and cope with the learning environment.

### **Discussion of the Findings**

Six research hypotheses related to the two major conjectures of the study were evaluated. This section discusses the findings related to each of the hypotheses.

Hypothesis 1: The hypothesis that dispositional barriers would be more problematic for adult students than would either institutional barriers or situational barriers was not supported. This is consistent with earlier findings. The hypothesis was advanced under the premise that dispositional barriers, defined as negative psychological

perceptions about oneself as a learner, would be more consuming, critical, and difficult to cope with than the more tangible situational and institutional barriers. The findings, however, revealed the reverse of that which was projected. Dispositional barriers were less problematic than either situational or institutional barriers to learning.

Given the nature of dispositional barriers, it seems reasonable to expect them to be more problematic and thus more prominent than the other barrier types. The question is: why do findings continually refute what, at least on the surface, seems so intuitively, if not theoretically, supportable?

One reason may relate to the intrapersonal characteristics of dispositional barriers. The process of revealing (dispositional barriers) negative perceptions of oneself as a learner requires an honest and careful self-evaluation and self-diagnosis. Adult students in this study may not have the skills necessary to identify or externalize fully their self-doubts. It may seem too threatening to disclose their weaknesses. Boshier (1973) reports that people tend to be inclined to identify external factors rather than internal factors when specifying problems they are having.

If the above is true, it raises another question which pertains to the technique used to assess barriers to learning. Self-reporting questionnaires, as used in this study, may not be the most appropriate way to reach the core of the intrapersonal and psychological characteristics of dispositional barriers. Instrumentation used to examine dispositional barriers may need to assist students in the process of self-evaluation and self-disclosure prior to asking them to specify dispositional barriers. Dispositional barriers may need to be assessed differently than institutional or situational barriers, and may even need to be assessed as an entity separate from institutional and situational barriers. Nevertheless, the

subjects in this study did not report that dispositional barriers were more difficult than other types of barriers.

**Hypothesis 2:** It was hypothesized that all three barrier dimensions would be more problematic for freshmen and sophomores than for juniors and seniors. Aslanian and Brickell (1980) reported that 83 percent of adult learners named past, present, or future transitions in their lives as motivating factors that caused them to start learning. It seemed likely that the trigger events that motivated freshmen and sophomore students to attend college would be more intense and recent. Further, if college is a means for moving through transitions, then those students who are further along (juniors and seniors) may be closer to having resolved their transitions.

The findings did reveal that all three barrier dimensions were more problematic for freshmen and sophomores than for juniors and seniors. The differences, however, are not significant. The lack of significance may be related to factors other than the year in college.

Unlike traditional-age students who usually do not experience a break in their formal education, adult students compose a wide spectrum of ages, have been out of formal education for various periods of time, and have a wide variety of family, work, and community experiences and responsibilities. The profile of freshman adult students may, therefore, be similar to the profile of senior adult students. Factors, other than year in college, which are reported to be problematic for adult students as they pursue their education, are children living at home and the length of time which had elapsed since last attending a college. Freshman and sophomore adult students are as likely to be mixed in these factors as are junior and senior adult students.

Although not conclusively supporting the hypothesis, the findings are encouraging. There are two factors that could have affected the significance level. The subjects in this study, by nature of being enrolled at the time of data collection, demonstrate a quality of persistence; that is, they have found ways that are effective for them to deal with adversity. Had the data been collected in the first few days of the term rather than in the latter part, there may have been more uncertainty by learners, and probably more uncertainty for freshmen than for seniors.

Hypothesis 3: It was hypothesized that all three barrier dimensions would be more problematic for younger adult students than for older adult students. Adult development theorists such as Gould, Levinson, and Sheehy propose that older adults come from a period of restlessness, questioning, and reflection to a more stable life of reality. Older adult students have been exposed to a variety of life situations and learning experiences simply to survive in our society. It was assumed that such experiences would provide wisdom and skills to draw upon as older students cope with and adapt to the potential barriers in their educational pursuits.

Although it was found that older adult students reported less difficulty with all three barrier dimensions than did younger adult students, the coefficients were small and accounted for only two to four percent of the variance. Interestingly, one demographic variable, the number of years which had elapsed since last attending a college, is reported to be significantly related to the three barrier dimensions. The longer the time since last attending a college, the less problematic the three barriers are. Again, the coefficients are small and account for only about one to two percent of the variance. Given the small amount of variance accounted for by age and years since last attending a

college, their practical significance is minimal.

These findings do suggest, however, that there may be an interdependent relationship between age and the number of years since last attending a college. This is consistent with Kolb's adaptation theory. Kolb's thesis of human development is that increasing competencies in the four learning modes and increasing experiences in employing these modes lead to greater complexity, relativism, and integration. As individuals move through their developmental stages, they develop greater capabilities to adapt. Consequently, it may be conjectured that as students mature, they are more likely to have developed skills that allow them to adapt to the learning environment.

Hypothesis 4: It was hypothesized that adult students with dominant learning styles would have more difficulty with dispositional barriers than with either institutional or situational barriers. The rationale for this hypothesis stems from Kolb's proposal that for students to be most effective as learners they need to develop the capacity to learn using four modes: concrete experience, reflective observation, abstract conceptualization, and active experimentation. It was assumed that students who have more skills in one or two of the modes, rather than the other modes, would have difficulty adapting to and coping with the learning environment. These dominant styles are based upon having greater skill in specific modes and less ability to use other modes.

Students with dominant learning styles are likely to encounter educational situations which are incongruent with their specific learning skills. Since these students have not developed the capacity or preference to learn using all four modes, they may experience frustrations with the learning environment and a feeling of inadequacy in their ability to learn.

The findings showed the reverse of what was projected. Dispositional barriers were less problematic than were either situational or institutional barriers for students with dominant learning styles. These findings also raise some interesting questions. Why do learners who have limited adaptive skills consistently report less difficulty with intrapersonally-related concerns than with externally-related concerns? As discussed earlier, the timing of data collection may be a factor, as well as the persistence of the subjects.

It is interesting, however, to conjecture that there may be some relationship between dominance in a given learning style and the effect of a compatible environment with that learning style. Kolb proposes that disciplines are inclined to different styles of learning. Universities are increasingly called upon to deliver knowledge, skills, and attitudes needed for students to fit into a highly complex and specialized society. These needs lead to an educational system which emphasizes specialized learning and development. Different disciplines and professions accentuate diverse developmental pathways. According to Kolb (1981b), "there is in each department or profession a sense of historical continuity and in most cases historical mission" (p. 233).

Students in this study with majors in the College of Business and the College of Natural Sciences more consistently reported a tendency toward convergent learning styles than did students in the other colleges. They also reported greater difficulty with barriers to learning than did students in the other colleges. According to Kolb (1985), the convergent learning style encompasses a set of competencies that are associated with decision skills: creating new ways of thinking and doing, experimenting with new ideas, choosing the best solution to problems, setting goals, and making decisions. It is likely

that students in these two colleges, who tend to have convergent learning styles, are not compatible with their academic disciplines. Either these students do not have the converger skills, or the disciplines are not soliciting the competencies associated with the convergent learning style.

Given that students with the convergent learning style report the most difficulty with barriers and that students in the College of Business and the College of Natural Sciences have convergent learning styles, it can be conjectured that there is a mismatch between students' learning styles and the learning demands of the academic disciplines in these two colleges. Further, it can be conjectured that students with convergent learning styles experience the most difficulties with the learning demands of their discipline.

Hypothesis 5: It was hypothesized that dispositional barriers would be more problematic for adult students with dominant learning styles than would adult students with balanced learning styles.

As previously discussed, Kolb proposes that increasing complexity and relativism occurs through integration of the dialectical modes of learning. It was assumed that the learning environment would elicit a variety of learning skills to challenge students to higher levels of cognitive functioning. It seemed that students with balanced learning styles, that is, those who had developed the capacity to learn using four modes, would experience fewer difficulties adapting to and coping with the learning environment. Students with dominant learning styles, on the other hand, would have skills in one or two learning modes over the others. As students with dominant learning styles are confronted with learning demands which are incongruent with their learning style, they would experience negative psychological perceptions about themselves as learners.



The findings revealed that students with dominant learning styles perceived dispositional barriers in a similar manner as did students with balanced learning styles. Finding dispositional barriers to be similar for both balanced and dominant learning styles may be reflective of the specialization function of higher education. Kolb proposes that at the highest stage of development learners need an integration of the four adaptive modes.

As previously discussed, different disciplines and professions, however, tend to emphasize specialized learning and development. The difficulty of accomplishing this level of learning maturity is that both society and higher education tend to reward specialization at the expense of integrative learning. It may be that academic disciplines foster the development of one learning mode which precipitates development in the other learning modes. The consequence of an emphasis on specialized occupational training is that students may not experience the integration of the four adaptive modes of learning.

It seems reasonable, therefore, that the learning environment for the students in this study was compatible with both dominant and balanced learning styles. Either students were able to adapt to the learning demands of the discipline, or their learning skills were compatible with the learning environment.

A review of the four learning style types shows that convergers reported the most difficulty with all three barriers, whereas assimilators reported the least difficulty with dispositional and situational barriers. Although convergers and assimilators share the abstract conceptualization mode of learning, they differ in how they process or transform the information. Assimilators tend to rely more on reflective observation, whereas convergers tend to rely more on active experimentation. It seems likely that convergers

have difficulties applying information to experience and using the information as a guide to further action. It is interesting to conjecture that barriers to learning may be related to specific learning styles rather than to the dominance level within one or two of the four adaptive learning modes.

**Hypothesis 6:** It was hypothesized that more juniors and seniors would have balanced learning styles than would freshmen and sophomores. It was assumed that junior and senior adult students would have experienced a greater diversity in teachers and classes from which to develop and expand their learning skills than would have freshmen and sophomore adult students. Further, they would have had more varied experiences with the routines and policies of the educational system than would have freshmen and sophomore adult students.

The findings revealed that about the same proportion of junior and senior adult students as of freshmen and sophomore adult students reported balanced learning styles. The findings suggest that factors other than year in college may influence adult students' learning styles.

Adult students have been described as self-directed, highly motivated, and committed and purposeful in their pursuit of specific educational and career goals (Cross, 1981). It follows that students with dominant learning styles may be experiencing a compatible environment, or that their qualities of persistence contribute to their ability to progress within the educational system.

As was previously reported, there is also no significant relationship between year in college and barriers to learning. Age, however, is significantly related to each of the three barrier dimensions. Older adult students have less difficulty with all three barrier

dimensions. Just as adult students may have found ways to deal with adversity and barriers to learning, so they may also have found ways to adapt their learning styles to the learning environment.

It is likely that the year in college of adult students is not significantly related to balanced learning styles. It may be that other factors such as age, length of time since last attending a college, or field of study are more likely to be related to balanced or dominant learning styles.

Post hoc analysis: A step wise multiple regression analysis was undertaken to ascertain the predictive capability of selected demographic variables for each of the barriers to learning. Two variables which entered the equation for situational barriers were having children living at home and the number of years since last attending a college. Therefore, it can be concluded that adult students with children living at home and who experienced a shorter interval since last attending a college will experience difficulties associated with situational barriers. Collectively, these two variables explain 18 percent of the variance in situational barrier scores.

These results support earlier findings. Younger adult students reported all three barriers to be more problematic than did older adult students. It can be assumed that younger adult students would also have younger children than would older adult students. The demands of the parental role of these students would be more time-consuming and complex.

Along with a different instrumentation for assessing barriers to learning, it seems reasonable that there is a need to know more about the intricacies of adult students' lives. For example, the kind of job responsibilities and demands, how long and when they

work, their parental role, the number and ages of children at home, their financial situation, the types and extent of community involvement, and what motivated them to pursue further a college education would be appropriate additional variables to consider. This information would provide a more in-depth profile of the learner.

### **Implications for Kolb's Theory of Experiential Learning**

The theory-base from which this study was developed is Kolb's theory of experiential learning. Kolb developed the Learning Style Inventory to measure individuals' inclinations on each of four dimensions of learning identified through an experiential learning cycle. Based on the experiential learning theory, Kolb proposes that for students to be most effective learners they need to develop the capacity to learn using four adaptive modes: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Skills in all four learning modes reflect a balance in the dialectical process of taking in and transforming information.

The research was designed to ascertain whether there is a relationship between learning styles of adult college students and their perceived barriers to learning. It was conjectured that adult students with balanced learning styles would be better able to cope with and adapt to the learning environment, whereas adult students with dominant learning styles would have more difficulties with all three barrier dimensions. The findings did not support that conjecture.

The results of this study, on the one hand, discourage projections regarding the relationship of dominant versus balanced learning styles and barriers to learning. For this study, it is particularly discouraging regarding the dispositional barrier dimension.

On the other hand, the study may have clarified the need for and direction of further research on the assumed relationships between barriers to learning and the learning styles of adult students in higher education. Given the assumption that the subjects in this study have resolved or adapted their learning style to be congruent with the learning environment, in retrospect it seems reasonable that there would be no significant differences between dominant and balanced learning styles and barriers to learning.

The rationale for this conclusion stems from Kolb's concept of specialization. Kolb (1984) proposes that the demands of a highly complex and specialized society call upon higher education to deliver specialized knowledge, skills, and attitudes for entry-level occupations. It seems reasonable, therefore, that if students with a particular learning style choose a field of study with similar learning demands, their approach to learning is likely to be nurtured. On the other hand, students who experience a mismatch between their learning styles and the learning demands of a particular field of study may adapt their learning style, change to a different field of study, or withdraw from the institution.

Further, it would be enlightening to test these projections on adult students at the time of their first encounters with college. It would also be potentially revealing to test these assumptions by including both those who initiated enrollment but did not follow through and those who have withdrawn from the institution. Students who have not experienced a learning environment within an academic discipline which is supportive and nurturing of their learning styles, may have the greatest difficulty with barriers to learning.

### **Implications for Higher Education**

Barriers to learning were assessed using the Barriers to Learning Index developed by the researcher. Barriers to learning, generally referred to as disruptive factors or barriers, were based on Cross' (1986) barriers to learning concept in which she categorized barriers as being either "dispositional," "institutional," or "situational" in nature. It was conjectured that if adult students perceived that their educational goals and needs are not congruent with those of the institution of higher education, they will experience difficulties in their educational pursuits. It was projected that dispositional barriers, defined as negative psychological perceptions about oneself as a learner, would be more consuming, critical, and difficult to cope with than the more tangible institutional and situational barriers. The findings showed the reverse of what was projected. Dispositional barriers were less problematic than were either institutional or situational barriers.

The findings in this study on barriers to learning are consistent with previous barriers to learning studies. These studies have produced substantial literature on ways institutions can better facilitate adult students as they pursue their educational goals and needs. Suggestions and implications from the findings in this study for higher educational practices would replicate much of the previous information.

Although these studies on barriers to learning have produced similar findings, there is a need to continue to investigate how adult students can fully realize their learning potential in higher education. A better understanding of adult students may be gained by exploring the relationship of barriers to learning and learning styles of nonpersisting adult students. Adult students who first encounter college, those who

initiated enrollment but did not follow through, and those who withdrew from the institution may provide the insights needed for higher education to facilitate all adult students.

### **Future Research**

It was conjectured that dispositional barriers would be more problematic than either institutional or situational barriers. This projection was based on the theoretically negative and disruptive psychological feelings that dispositional barriers generate about oneself as a learner. The adult students in this study perceived, however, that institutional and situational barriers were more problematic than were dispositional barriers.

Research on barriers to learning which follows this study should use a technique which reaches the core of the intrapersonal and psychological characteristics of dispositional barriers. This technique could include in-depth interviews by individuals trained in personal analysis, personal essays or diaries, or focus group interviews. These techniques offer a more personal focus which may be more supportive to excising intrapersonal viewpoints. Answers to questions such as the following could be pursued: What, specifically, are the barriers adult students are experiencing? How does the problem affect them? How does the problem interfere with their learning? Where does the barrier originate? Are they working to alleviate the problem? How? What skills are required to reduce its influence on them?

Students may not have sufficient or necessary skills, or may feel threatened with disclosing their weaknesses or problems. The above techniques might better assist students in the process of self-evaluation and self-disclosure prior to specifying

dispositional barriers.

It would be of interest to examine the dominant versus balanced levels of a given learning style and the effects of a compatible academic discipline. Academic disciplines accentuate one set of learning skills over others. It would be of value to know if there are compatible adaptive skills between academic disciplines and students with dominant learning styles.

Future studies which examine the dominant versus balanced learning styles need to include a sample large enough to include sufficient representation of a number of factors. These factors include sufficient representation of: 1) each of the four learning styles, 2) balanced learning modes, 3) dominant learning modes, 4) various ages, 5) parental responsibilities, 6) various amounts of time since last attending a college, and 7) a variety of areas of specialization. With this kind of representation, there would be greater precision for drawing conclusions on the relationship of adult students' learning styles and barriers to learning.

It would be of interest in future studies to learn more about the relationship of the learning styles and barriers to learning of nonpersisting adult students. Included in a study which encompasses nonpersisters would be adult students during their first encounters with college, those who initiated enrollment but did not follow through, and those who withdrew from the institution. It would be enlightening to know the compatibility of these students' learning styles with the learning demands of their academic disciplines. In addition to knowing the compatibility of learning styles and learning demands, it would be interesting to know how these students perceive barriers to learning.



It would be interesting to do a longitudinal study of adult students throughout their course of study in higher education. An aspect to explore would be if changes in learning styles influence perceived barriers to learning. Of particular interest would be modifications in nondominant modes of learning. What changes are there in the compatibility of students' learning styles and the learning demands of the discipline as students change from one academic discipline into a different discipline? Do students come to perceive barriers to learning differently as they pursue a different field of study? Is there a tendency toward a specific learning style or dominance in particular learning modes for students who withdraw from the academic system?

### Conclusions

This study was an effort to structure research upon theory, in order to provide a theoretical foundation for understanding sources of barriers to learning. The research was designed to ascertain whether there is a relationship between learning styles of adult college students and their perceived barriers to learning.

It was projected that adult students would have greater difficulties with dispositional barriers than with institutional or situational barriers, and that students with dominant learning styles would have more difficulties with all three barrier dimensions than would students with balanced learning styles.

The study has clarified the need for and the possible direction of further research on the assumed relationships between barriers to learning and learning styles of adult students in higher education. Given the assumption that the subjects in the study have resolved or adapted their learning style to be congruent with the learning environment, in retrospect it seems reasonable that there would be no significant relationship between

dominant versus balanced learning styles and barriers to learning. It would be of value to test these projections on adult students at the time of their first encounters with college, on those who initiated enrollment but did not follow through, and on those who withdrew from the institution.

## BIBLIOGRAPHY

- Antaki, C. & Brewin, C. (1982). Attributions and Psychological Change. New York, NY: Academic Press, Inc.
- Apps, J. W. (1979). Problems in Continuing Education. New York: McGraw-Hill Book Company.
- Apps, J. W. (1981). The Adult Learner on Campus. Chicago: Follett Publishing Company.
- Aslanian, C. B. & Brickell, H. M. (1980). Americans in Transition: Life Changes as Reasons for Adult Learning. New York: College Entrance Examination Board.
- Aslanian, C. B. & Brickell, H. M. (1988). How Americans in Transition Study for College Credit. New York: College Entrance Examination Board.
- Boshier, R. (1971). Motivational orientations of adult education participants: A factor analytic exploration of Houle's Typology. Adult Education, 21(2), 3-26.
- Boshier, R. (1973). Educational participation and dropout: A theoretical model. Adult Education, 23(4), 255-282.
- Boshier, R. (1978). A perspective on theory and model development in adult education. Paper presented at the Commission of Professors of Adult Education, Portland, OR.
- Briggs, I. B. (1985). Gifts Differing. Palo Alto, CA: Consulting Psychologists Press, Inc.
- Carne, M. E. (1985). Role strain in the returning adult student (Doctoral dissertation, University of Wisconsin - Madison, 1984). Dissertation Abstracts International, 45, 1955-A.
- Carp, A., Peterson, R. and Roelfs, P. (1974). Adult learning interests and experiences. In K. P. Cross, J. R. Valley, and Associates. Planning Non-Traditional Programs: An Analysis of the Issues of Post Secondary Education. San Francisco, CA: Jossey-Bass.
- Chickering, A. W. (1981). The Modern American College. San Francisco: Jossey-Bass Publishers.
- Clark, J. H. (1980). Adults in the college setting: Deciding to develop skills. Adult Education, 30(2), 92-110.
- Claxton, C. S. & Murrell, P. H. (1987). Learning Styles: Implications for Improving Educational Practices. ASHE-ERIC Higher Education Report No. 4.

- Claxton, C. S. & Ralston, Y. (1978). Learning Styles: Their Impact on Teaching and Administration. (Report No. 10). Washington, D. C.: American Association for Higher Education. (ERIC Document Reproduction Service No. ED 167 065).
- Conoley, J. C. & Kramer, J. J. (1989). The Tenth Mental Measurement Yearbook. The University of Nebraska-Lincoln: The Buros Institute of Mental Measurement.
- Cross, K. P. (1978). The Missing Link: Connecting Adult Learners to Learning Resources. New York: College Entrance Examination Board.
- Cross, K. P. (1981). Adults as Learners: Increasing Participation and Facilitating Learning. San Francisco, CA: Jossey-Bass Publishers.
- Cross, K. P. (1986). Adults as Learners. San Francisco, CA: Jossey-Bass Publishers.
- Cross, K. P., Tough, A., & Weathersby, R. (1978). The adult learner. Current Issues in Higher Education. Washington, D. C.: American Association for Higher Education.
- Curry, L. (1981). Learning styles as individual differences. In L. Curry (Ed.), Learning Styles in Continuing Medical Education (pp.50-53). Ottawa, Ontario: Council on Medical Education.
- Curry, L. (1983). An Organization of Learning Styles Theory and Construction. Montreal, Quebec: Paper presented at the Annual Meeting of the American Educational Research Association. (ERIC Document Reproduction Service No. ED 235 185).
- Darkenwald, G. G. (1984). Participation in education by young adults. In A. B. Knox (Ed.), New Directions for Continuing Education, No. 21. San Francisco: Jossey-Bass.
- Darkenwald, G. G. & Merriam, S. B. (1982). Adult Education: Foundations of Practice. New York: Harper & Row, Publishers.
- Darkenwald, G. G. & Valentine, T. (1985). Factor structure of deterrents to public participation in adult education. Adult Education Quarterly, 35(4), 177-193.
- Dewey, J. (1938). Experience and Education. New York: Macmillan Co.
- Digest of Educational Statistics 1987. (1987). Center for Educational Statistics, Office of Educational Research and Improvement. Washington, D. C.: U. S. Department of Education.
- Dixon, N. (1982). Incorporating learning style into training design. Training and Development Journal, 36, 62-64.

- Dorsey, O. L. & Pierson, M. J. (1984). A descriptive study of adult learning styles in a nontraditional education program. Lifelong Learning: An Omnibus of Practice and Research, 7(8), 8-11.
- Erikson, E. H. (1950). Childhood and Society. New York: W. W. Norton.
- Farrell, B. G. (1983). A factor analytic comparison of four learning-style instruments. Journal of Educational Psychology, 75(1), 33-39.
- Festinger, L. (1976). A Theory of Cognitive Dissonance. Stanford, CA: Stanford University Press.
- Flannery, D. D. (1986). The relationship between multiple roles, barriers to learning, and persistence/withdrawal for returning adult students (Doctoral dissertation, University of Wisconsin - Madison, 1986). Dissertation Abstracts International, 47, 1152-A.
- Fox, R. D. (1984). Learning styles and instructional preferences in continuing education for health professionals: A validity study of the LSI. Adult Education Quarterly, 35(2), 72-85.
- Geisler, M. P. & Thrush, R. S. (1975). Counseling experiences and needs of older women students. Journal of the National Association for Women Deans, Administrators, and Counselors, 39(1), 3-8.
- Gould, R. L. (1972). The phases of adult life: A study in developmental psychology. American Journal of Psychiatry, 129(5), 33-43.
- Gould, R. L. (1978). Transformations: Growth and Change in Adult Life. New York: Simon & Schuster.
- Grasha, A. F. (1981). Learning style: the journey from Greenwich Observatory (1976) to Dalhousie University (1981). In L. Curry (Ed.), Learning Styles in Continuing Medical Education (pp. 29-41). Ottawa, Ontario: Council on Medical Education.
- Gregorc, A. F. (1979). Learning/teaching styles: potent forces behind them. Educational Leadership, 36(4), 234-236.
- Havighurst, R. J. (1972). Developmental Tasks and Education (3rd ed). New York: David McKay Company.
- Johnstone, J. W. C. & Rivera, R. J. (1965). Volunteers for Learning: A Study of the Educational Pursuits of Adults. Chicago: Aldine Publishing Company.
- Kasworm, C. E. (1980). The older student as an undergraduate. Adult Education, 31(1), 30-47.

- Keefe, J. W. (1987). Learning Style Theory and Practice. Reston, VA: National Association of Secondary School Principals.
- Kidd, J. R. (1977). How Adults Learn. New York: Association Press.
- Kirk, S. L. (1986). The assessment of learning styles and cognitive development of adult students in a higher education setting (Doctoral dissertation, University of Northern Colorado, 1986). Dissertation Abstracts International, 47, 1981-A.
- Kolb, D. A. (1976). The learning styles inventory: Technical manual. Boston: McBer and Company.
- Kolb, D. A. (1981a). Experiential learning theory and the learning style inventory: A reply to Freedman and Stumpf. Academy of Management Review, 6(2), 289-296.
- Kolb, D. A. (1981b). Learning styles and disciplinary differences. In A. W. Chickering and Associates (Eds.), The Modern American College (pp. 232-255). San Francisco: Jossey-Bass Publishers.
- Kolb, D. A. (1983). Future directions for learning style research. In L. Curry, Learning Styles in Continuing Medical Education (pp. 100-114). Ottawa, Ontario: Council on Medical Association.
- Kolb, D. A. (1984). Experiential Learning: Experience as the Source of Learning and Development. Englewood Cliffs, NJ: Prentice-Hall, Inc.
- Kolb, D. A. (1985). Learning Style Inventory: Self-scoring and Interpretation Booklet. Boston, MA: McBer and Company.
- Kolb D. A. & Fry, R. (1975). Towards an applied theory of experiential learning. In C. Cooper (Ed.), Theories of group process (pp. 33-57). New York: Wiley.
- Kolb, D. A., Rubin, I. M. & McIntyre, J. M. (1984). Organizational Psychology: An Experiential Approach to Organizational Behavior (4th ed.). Englewood Cliffs, NJ: Prentice-Hall, Inc.
- Korhonen, L. J. & McCall, R. J. (1986). The interaction of learning style and learning environment on adult achievement. Lifelong Learning: An Omnibus of Practice and Research, 10, 21-23.
- Kotar, M. E. (1980). An investigation of a learning style inventory with selected educational groups (Illinois State University, 1980). Dissertation Abstracts International, 42, 177-A.

- Krupp, Judy-Arin. (1982). The Adult Learner: A Unique Entity. Manchester, CT: Adult Development and Learning.
- Lance, L., Lourie, J., and Mayo, C. (1979). Difficulties of re-entry students by sex and length of school interruption. Journal of the National Association for Women Deans, Administrators, and Counselors, 42(3), 39-42.
- Lassan, R. (1984). Learning style differences: registered nurse students vs. generic student nurses at the baccalaureate level. (ERIC Document Reproduction Service No. 240 318).
- Levinson, D. J. (1978). The Seasons of a Man's Life. New York: Alfred A. Knopf.
- Levinson, D. J. (1986). A conception of adult development. American Psychologist, 41(1), 3-13.
- Lewin, K. (1951). Field Theory in Social Sciences. San Francisco: Jossey-Bass.
- Lewis, L. H. (Ed.). (1988). Addressing the Needs of Returning Women, No. 39. San Francisco: Jossey-Bass Inc., Publishers.
- Long, H. B. (1983). Adult Learning: Research and Practice. New York: Cambridge.
- Lunneborg, P. W., Olch, D. R. & DeWolf, V. (1974). Prediction of college performance in older students. Journal of Counseling Psychology, 21(3), 215-221.
- Marienau, C. and Klinger, K. (1977). An Anthropological Approach to the Study of Educational Barriers of Adults at the Postsecondary Level. (ERIC Document Reproduction Service No. ED 141 511).
- Mark, M. & Menson B. (1982). Using David Kolb's experiential learning theory in portfolio development courses. In B. Menson (Ed.). New Directions for Experiential Learning: Building on Experiences in Adult Development, 16 (pp. 65-74). San Francisco: Jossey-Bass.
- Maslow, A. H. (1954). Motivation and Personality. New York: Harper and Rows.
- McCarthy, B. (1981). The 4MAT System: Teaching to Learning Styles with Right/Left Mode Techniques. Oak Brook, IL: EXCEL, Inc.
- McCoy, V. R. (1977). Adult life cycle change. Lifelong Learning: The Adult Years, 1(2), 14-18, 31.

- Mentokowski, M. & Strait, M. J. (1983). A longitudinal study of student change in cognitive development and generic abilities in outcome-centered liberal arts curriculum. Washington, D. C.: National Institute of Education. (ED 239 562).
- Merriam, S. B. (1984). Adult development: implications for adult education. (Information Series No. 282). Columbus, OH: The Ohio State University, The National Center for Research in Vocational Education. (ERIC Clearinghouse on Adult, Career, and Vocational Education No. ED 246 309).
- Messick, S. and Associates (Eds.). (1976). Individuality in Learning. San Francisco, CA: Jossey-Bass.
- Moore, G. W. (1983). Developing and Evaluating Educational Research. Boston: Little, Brown and Company.
- Moore, W. Y. C. (1985). Barriers non-traditional age freshmen women they seek entrance to four-year college and universities (Doctoral dissertation, University of Oregon, 1984). Dissertation Abstracts International, 42, 4304-A.
- Neugarten, B. L. (1976). Adaptation and the life cycle. The Counseling Psychologist, 6(1), 16-20.
- Neugarten, B. L. (1978). Time, age, and the life cycle. American Journal of Psychiatry, 136(7), 887-894.
- Piaget, J. (1964). Cognitive development in children. In R. Ripple and V. Rockcastle (Eds.) Piaget Rediscovered: A Report on Cognitive Studies in Curriculum Development. Ithaca, NY: School of Education, Cornell University.
- Piaget, J. (1972). Psychology and Epistemology: Towards a Theory of Knowledge. New York: Viking Press.
- Pigg, K. E., Busch, L. & Lacy, W. B. (1980). Learning styles in adult education: A study of county extension agents. Adult Education, 30(4), 233-243.
- Richter, D. L. (1983). A comparison of anticipated and experienced barriers to further formal education as perceived by adult students in Charleston, South Carolina area (Doctoral dissertation, University of South Carolina, 1982). Dissertation Abstract International, 43, 2201-A.
- Richter, D. L. & Witten, C. H. (1984). Barriers to adult learning: Does anticipation match reality? Journal of College Student Personnel, 25(5), 465-467.



- Riechmann, S. W. & Grasha, A. F. (1974). A rationale approach to developing and assessing the construct validity of a student learning style scale instrument. Journal of Psychology, 87, 213-223.
- Roelfs, P. J. (1975). Teaching and counseling older college students. Princeton, NJ: Educational Testing Service Research Programs for Higher Education. (ERIC Document Reproduction Service No. ED 130 737).
- Schmeck, R. R. (1977). Development of a self-report inventory for assessing individual differences in learning process. Applied Psychological Measurement, 1, 413-431.
- Schmeck, R. R. (1981). Improving learning by improving thinking. Educational Leadership, 38(5), 384-38
- Schlossberg, N. K., Lynch, A. Q., and Chickering, A. W. (1989). Improving Higher Education Environments for Adults. San Francisco, CA: Jossey-Bass Publishers.
- Sims, R. R., Veres, J. G., Watson, P. & Buckner, K. E. (1986). The relationship and classification stability of the learning style inventory. Educational and Psychological Measurement, 46, 753-761.
- Smallwood, K. B. (1980). What do adult women college students really need? Journal of College Student Personnel, 21(1), 65-73.
- Stafford, K. L., Lundstedt, S. B. & Lynn, A. D., Jr. (1984). Social and economic factors affecting participation in higher education. Journal of Higher Education, 55(5), 590-608.
- Steitz, J. A. (1987). Issues of adult development within the academic environment. Lifelong Learning: An Omnibus of Practice and Research, 11(1), 15-18, 27.
- Steltenpohl, E. & Shipton, J. (1986). Facilitating a successful transition to college for adults. Journal of Higher Education, 57(6), 637-658.
- Stumpf, S. A. & Freedman, R. D. (1981). The learning style inventory: Still less than meets the eye. Academy of Management Review, 6(2), 297-299.
- Thelen, H. (1954). Dynamics of Groups at Work. Chicago, IL: Chicago Press.
- Tittle, C. K. & Denker, E. R. (1977). Re-entry women: A selective review of educational process, career choice, and interest measurement. Review of Educational Research, 47(4), 531-584.

- Weathersby R. P. & Tarule, J. M. (1980). Adult development: Implications for higher education. (Report No. 4). American Association for Higher Education. (ERIC Document Reproduction Service No. ED 191 382).
- Witkin, H. A. (1976). Cognitive style in academic performance and in teacher-student relations. In S. Messick and Associates (Eds.), Individuality in Learning (pp. 38-72). San Francisco: Jossey-Bass.
- Witkin, H. A., Moore, C. A., Goodenough, D. R., & Cox, D. W. (1977). Field dependent and field-independent cognitive styles and their educational implications. Review of Educational Research, 47(1), 1-64.

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**APPENDIX A.**

**HUMAN SUBJECTS APPROVAL**

- | Name of Committee Chairperson | Date    | Signature of Committee Chairperson |
|-------------------------------|---------|------------------------------------|
| George G. Keres               | 4.18.54 | DMK/5/4                            |

**University of Northern Iowa**

The Graduate College

Cedar Falls, Iowa 50614  
Telephone (319) 273-2748

March 10, 1989

Professor Jane Mertesdorf  
Department of Health, Physical Education, and Recreation  
University of Northern Iowa  
Cedar Falls, IA 50614

Dear Professor Mertesdorf:

Your project, "The Relationship of Learning Styles and Barriers to Learning of Adult Students on Campus", which you submitted for human subjects review on March 10, 1989 has been determined to be exempt from further review under the guidelines stated in the UNI Human Subjects Handbook. You may commence participation of human research subjects in your project.

Your project need not be submitted for continuing review unless you alter it in a way that increases the risk to the participants. If you make any such changes in your project, you should notify the Graduate College Office.

If you decide to seek federal funds for this project, it would be wise not to claim exemption from human subjects review on your application. Should the agency to which you submit the application decide that your project is not exempt from review, you might not be able to submit the project for review by the UNI Institutional Review Board within the federal agency's time limit (30 days after application). As a precaution against applicants' being caught in such a time bind, the Board will review any projects for which federal funds are sought. If you do seek federal funds for this project, please submit the project for human subjects review no later than the time you submit your funding application.

If you have any further questions about the Human Subjects Review System, please contact me. Best wishes for your project.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Norris M. Durham'.

Norris M. Durham, Ph.D.  
Chair, Institutional Review Board

cc: Dr. John Somervill, Graduate Dean

**APPENDIX B.**

**DEMOGRAPHIC DATA OF SUBJECTS**



Table 30. Frequency of Gender

Sex	Frequency	Percent
Female	287	66.6
Male	144	33.4

Table 31. Frequency of Age

Age	Frequency	Percent
25 – 34	245	56.8
35 – 45	154	35.7
46 and older	29	6.7

Table 32. Frequency of Marital Status

Marital Status	Frequency	Percent
Never married	115	26.7
Married	233	54.1
Separated–divorced	75	17.4
Widowed	7	1.6

Table 33. Frequency of Children Living at Home

Response	Frequency	Percent
Yes	246	57.1
No	172	39.9

Table 34. Frequency of Employment Status

Employment Status	Frequency	Percent
Employed Full-time	111	25.8
Employed Part-time	137	31.8
Unemployed	71	16.5
Homemaker	73	16.9
Retired	3	.7
Other	25	5.8

Table 35. Frequency of Miles to Campus

Miles	Frequency	Percent
0 to 1	87	20.2
2 to 3	80	18.6
4 to 6	37	8.6
7 to 9	35	8.1
10 to 19	93	21.6
20 or more	89	20.6

Table 36. Frequency of Classification

Classification	Frequency	Percent
Freshman	42	9.7
Sophomore	68	15.8
Junior	98	22.7
Senior	191	44.3
Unclassified	28	6.5

Table 37. Frequency of Credit Hours

Credit Hours	Frequency	Percent
Part-time	225	52.2
Full-time	204	47.3

Table 38. Frequency of Major by College

College	Frequency	Percent
College of Business	90	20.9
College of Education	85	20.0
College of Social & Behavioral Science	47	11.1
College of Natural Science	74	17.2
College of Humanities & Fine Arts	49	11.4
Division of Continuing Education	33	7.7
Pre-professional	34	7.9

**Table 39. Frequency of Time of Day Attended Classes**

<b>Time of Day</b>	<b>Count</b>	<b>Percent of Responses</b>
<b>Mornings</b>	<b>297</b>	<b>44.5</b>
<b>Afternoons</b>	<b>206</b>	<b>30.8</b>
<b>Evenings</b>	<b>147</b>	<b>22.0</b>
<b>Saturdays</b>	<b>4</b>	<b>.6</b>

**Table 40. Frequency of Previously Attended a College**

<b>Response</b>	<b>Frequency</b>	<b>Percent</b>
<b>Yes</b>	<b>297</b>	<b>68.9</b>
<b>No</b>	<b>133</b>	<b>30.9</b>

**APPENDIX C.**

**COVER LETTER ACCOMPANYING THE QUESTIONNAIRE**

# Center for Social and Behavioral Research

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College of Social and Behavioral Sciences  
University of Northern Iowa  
Cedar Falls, Iowa 50614  
(319) 273-2105

April 21, 1989

We are conducting a special survey of UNI adult students, 25 years old and older, to identify any problems or difficulties they may experience while pursuing a university education. The results of our study will be used to help students on our campus and elsewhere in completing their educational careers. Your name was selected at random for inclusion in our study.

We would appreciate your completing the enclosed questionnaire and returning it in the postage-paid envelope provided. Your individual responses to questions will not be identified in any oral or written summaries or reports, since we do not ask for your name.

By your participating in this study you will be providing valuable information which will be used by university faculty, administrators, student service personnel, and others in order to better facilitate students' learning needs. We value your thought and opinions on this important subject and appreciate your completing and returning the questionnaire.

If you have any questions regarding this study, please telephone our office. Thank you for your assistance in this study.

Sincerely,

Jane Mertesdorf  
Assistant Professor

Encl (2)

**APPENDIX D.**

**QUESTIONNAIRE**

**CENTER FOR SOCIAL AND BEHAVIORAL RESEARCH**  
**University of Northern Iowa**

**Learning Experience Study**

**Directions:** Listed below are tasks, activities, responsibilities, and feelings that students experience as they pursue their education. Please read each statement and circle the extent to which the item is a problem for you in pursuing your university education. If an item does not apply, do not circle a number.

	Not a Problem						Major Problem	
	1	2	3	4	5	6	7	
Knowing what is important to learn in classes.	1	2	3	4	5	6	7	
Concentration in classes.	1	2	3	4	5	6	7	
Showing ambition in classes.	1	2	3	4	5	6	7	
Being overwhelmed with all I need to know.	1	2	3	4	5	6	7	
How I am graded on tests, assignments or class participation.	1	2	3	4	5	6	7	
The amount of work classes require.	1	2	3	4	5	6	7	
Experiencing stress in classes and studying.	1	2	3	4	5	6	7	
Not having enough time to complete exams.	1	2	3	4	5	6	7	
Experiencing anxiety when taking exams.	1	2	3	4	5	6	7	
Feeling comfortable with my study skills.	1	2	3	4	5	6	7	
Being accepted as a student by instructors.	1	2	3	4	5	6	7	
Feeling uneasy about visiting with instructors.	1	2	3	4	5	6	7	
Advising from faculty.	1	2	3	4	5	6	7	
Feeling confident as a student.	1	2	3	4	5	6	7	
Feeling older than other students.	1	2	3	4	5	6	7	
Being accepted by younger students.	1	2	3	4	5	6	7	
Dealing with inflexible attendance requirements.	1	2	3	4	5	6	7	
Classes stimulate learning.	1	2	3	4	5	6	7	
Being able to experience or apply the subject matter in my classes.	1	2	3	4	5	6	7	
Having faculty available for appointments when I am on campus or available.	1	2	3	4	5	6	7	
Having support service personnel available for appointments when I am on campus.	1	2	3	4	5	6	7	
Getting career or academic advising.	1	2	3	4	5	6	7	
Getting registered for classes.	1	2	3	4	5	6	7	



	Not a Problem 1	2	3	4	5	6	Major Problem 7
The availability of university adult student social activities.	1	2	3	4	5	6	7
Receiving information about financial aid or student loans.	1	2	3	4	5	6	7
The length of time to complete the program.	1	2	3	4	5	6	7
Having classes available at convenient times.	1	2	3	4	5	6	7
Having space & equipment available when I am free to use the library, computer terminals, and laboratories.	1	2	3	4	5	6	7
Availability of campus parking.	1	2	3	4	5	6	7
Having a place to study when not on campus.	1	2	3	4	5	6	7
Having enough time for assignments or studying.	1	2	3	4	5	6	7
Paying for the cost of books, supplies or fees.	1	2	3	4	5	6	7
Paying for the cost of tuition.	1	2	3	4	5	6	7
Having my family understand the demands on me as a student.	1	2	3	4	5	6	7
Having competent child care.	1	2	3	4	5	6	7
Having enough time to spend with my family.	1	2	3	4	5	6	7
Paying for the cost of child care.	1	2	3	4	5	6	7
Having my friends understand the demands on me as a student.	1	2	3	4	5	6	7
Having time for social activities.	1	2	3	4	5	6	7
Having job responsibilities.	1	2	3	4	5	6	7
Having enough time for my job.	1	2	3	4	5	6	7
Having to pay the cost of transportation.	1	2	3	4	5	6	7
Travel distance to campus.	1	2	3	4	5	6	7

**Directions:** On the following page you will be asked to complete a number of sentences. Each has four endings. Rank the ending for each sentence according to how well you think each one fits with how you would go about learning something. Try to recall some recent situation where you had to learn something new. Then, using the space provided, rank a "1" for the sentence ending that describes how you learn best, down to a "4" for the sentence ending that seems least like the way you would learn. Be sure to rank all of the endings for each sentence unit. Please do not make ties. The following is an example of a completed sentence set:

When I learn:      — I am              — I am              — I am              — I am  
                             happy.              fast.              logical.              careful.

Please remember: Do not make ties, and rank as follows:

- 1 = Most like you  
 2 = Second most like you  
 3 = Third most like you  
 4 = Least like you

When I learn:	— I like to deal with my feelings.	— I like to watch and listen.	— I like to think about ideas.	— I like to to be doing things.
I learn best when:	— I trust my hunches and feelings.	— I listen and watch carefully.	— I rely on logical thinking.	— I work hard to get things done.
When I am learning:	— I have strong feelings and reactions.	— I am quiet and reserved.	— I tend to reason things out.	— I am responsible about things.
I learn by:	— feeling.	— watching.	— thinking	— doing.
When I learn:	— I am open to new experiences.	— I look at all sides of issues.	— I like to analyze things, break them down into their parts.	— I like to try things out.
When I am learning:	— I am an intuitive person.	— I am an observing person.	— I am a logical person.	— I am an active person.
I learn best from:	— Personal relationships.	— Observation.	— Rational theories.	— A chance to try out and practice.
When I learn:	— I feel personally involved in things.	— I take my time before acting.	— I like ideas and theories.	— I like to see results from my work.
I learn best when:	— I rely on my feelings.	— I rely on my observations.	— I rely on my ideas.	— I can try things out for myself.
When I am learning:	— I am an accepting person.	— I am a reserved person.	— I am a rational person.	— I am a responsible person.
When I learn:	— I get involved.	— I like to observe.	— I evaluate things.	— I like to be active.
I learn best when:	— I am receptive and open-minded.	— I am careful.	— I analyze ideas.	— I am practical.

(OVER, PLEASE)

In order to have a better understanding of the students participating in this study, we would appreciate your answers to the following background information questions.

What is your sex? ☐ Female ☐ Male

What was your age on your last birthday? \_\_\_\_\_

What is your current marital status?

☐ Never Married ☐ Married ☐ Separated/Divorced ☐ Widowed

Are you the parent or guardian of children living with you in your home? ☐ Yes ☐ No

What is your current employment status? (Please check only one answer.)

☐ Employed full-time (40+ hrs/week) ☐ Retired  
☐ Employed part-time ☐ Other (Please specify:)  
☐ Unemployed \_\_\_\_\_  
☐ Homemaker \_\_\_\_\_

If you are currently employed, what kind of work do you do? What is your main occupation called? \_\_\_\_\_

Were you ever employed after graduating from high school? ☐ Yes ☐ No

If you were employed after graduating from high school, what kind of work did you do? What was (were) your occupation(s) called? \_\_\_\_\_

If you live off-campus, approximately how many miles away from campus do you live?  
 \_\_\_\_\_ Miles \_\_\_\_\_ Less than one mile

What is your present student classification?

☐ Freshman ☐ Sophomore ☐ Junior ☐ Senior ☐ Unclassified

How many semester hours of credit did you take at UNI during the Spring 1989 semester?  
 \_\_\_\_\_ Semester hours

What is your major? (If you have not declared a major, please indicate your intended major.) Please be specific when stating your major.

Major: \_\_\_\_\_

What time of day are you usually on campus for most of your classes? (Please check all that apply.) ☐ Morning ☐ Afternoon ☐ Evening ☐ Saturday  
☐ Other (please specify) \_\_\_\_\_

Did you attend a college or university before your enrollment at UNI? ☐ Yes ☐ No

If "Yes" above, how many years of college did you complete? \_\_\_\_\_ Years

If "Yes" above, how many years, if any, had elapsed between your current enrollment at UNI and the last time you attended a college?

[If "none," please enter a zero (0).] \_\_\_\_\_ Years

-- THANK YOU FOR PARTICIPATING IN THIS STUDY --

**APPENDIX E.**

**BARRIERS TO LEARNING BY DIMENSIONS**

**DISPOSITIONAL BARRIERS:**

1. Knowing what is important to learn or master in classes.
2. Concentration in classes.
3. Showing Ambition in classes.
4. Being overwhelmed with all I need to know.
5. How I am graded on tests, assignments, or class participation.
6. The amount of work classes require.
7. Experiencing stress in classes and studying.
8. Not having enough time to complete exams.
9. Experiencing anxiety when taking exams.
10. Feeling comfortable with my study skills.
11. Being accepted as a student by instructors.
12. Feeling uneasy about visiting with instructors.
14. Feeling confident as a student.
15. Feeling older than other students.
16. Being accepted by younger students.

**INSTITUTIONAL BARRIERS:**

13. Advising from faculty.
17. Dealing with inflexible attendance requirements.
18. Classes stimulate learning.
19. Being able to experience or apply the subject matter in my classes.
20. Having faculty available for appointments when I am on campus and available.
21. Having support service personnel available for appointments when I am on campus.
22. Getting career or academic advising.
23. Getting registered for classes.
24. The availability of University adult student social activities.
25. Receiving information about financial aid or student loans.
26. The length of time to complete the program.

- 27. Having classes available at convenient times.
- 28. Having space & equipment available when I am free to use the library, computer terminals, and laboratories.
- 29. Availability of campus parking.

**SITUATIONAL BARRIERS:**

- 30. Having a place to study when not on campus.
- 31. Having enough time for assignments or studying.
- 32. Paying for the cost of books, supplies or fees.
- 33. Paying for the cost of tuition.
- 34. Having my family understand the demands on me as a student.
- 35. Having competent child care.
- 36. Having enough time to spend with my family.
- 37. Paying for the cost of child care.
- 38. Having my friends understand the demands on me as a student.
- 39. Having time for social activities.
- 40. Having job responsibilities.
- 41. Having enough time for my job.
- 42. Having to pay the cost of transportation.
- 43. Travel distance to campus.

## APPENDIX F.

## VALIDITY AND RELIABILITY OF KOLB'S LSI

Only limited data on the 1985 version of the LSI are available, and therefore much of the following is in reference to the 1976 version of the LSI.

Validity: The 1976 LSI was submitted to correlational studies related to performance tests, personality tests, and preferences for learning situations and educators. Kolb (1976, p. 28) reports correlations between the LSI and The Myers-Briggs Type Indicator as shown in Table 41.

Table 41. Correlations Between Learning Style Inventory Scores and Personality Tests

Test Variable	Group	n	CE	RO	AC	AE	AC-CE	AE-RO
<b>MYERS-BRIGGS TYPE INDICATOR<sup>a</sup></b>								
Extraversion/ Introversion	Kent State Undergrads	135	.06	.06	.03	-.18*	-.01	-.13
	U. of Wisc. MBAs	74	.08	.34**	.03	-.27*	--	--
Sensation/ Intuition	Undergrads	135	-.25**	-.07	.23**	-.20*	.29**	.09
	MBAs	74	-.02	-.15	.19	-.12	--	--
Thinking/ Feeling	Undergrads	135	.34**	-.02	-.25**	.05	-.35**	.04
	MBAs	74	.08	-.17	.00	-.01	--	--
Judging/ Perceiving	Undergrads	135	-.06	.11	-.11	-.13	-.02	-.16
	MBAs	74	.01	-.12	.06	-.05	--	--

<sup>a</sup>High scores on MBTI variables indicate that the mode listed second is dominant (e.g., a high score on thinking/feeling indicates the dominance of feeling orientations).

\*  $p < .05$ .

\*\*  $p < .01$  2 tailed test.

Table 41. (Continued)

Test Variable	Group	n	CE	RO	AC	AE	AC-CE	AE-RO
<b>MYERS-BRIGGS TYPE INDICATOR<sup>b</sup></b>								
Extraversion	Education Administr.	46	-.13	-.27	.28	--	.25	-.16
Introversion	"	46	.18	.36*	-.35*	--	-.20	-.33*
Sensation	"	46	--	.12	-.26	-.11	-.19	-.13
Intuition	"	46	--	--	.20	--	.14	--
Thinking	"	46	-.31*	--	.22	-.16	.30*	-.16
Feeling	"	46	.39**	--	-.34*	.12	-.42**	.11
Judging	"	46	-.22	--	--	--	.14	--
Perceiving	"	46	.19	--	--	--	--	--

<sup>b</sup>Scores on these MBTI variables are limited to the single modes and are not comparable to paired modes. Missing correlations are due to missing data.

Reliability: Kolb (1985, p. 4) reported high internal reliability of the 1985 LSI as measured by Cronbach standardized scale alpha, shown below in Table 42.

Kolb (1985, p. 5) compared the LSI 1985 with items from the original LSI ("OLSI"). He reported comparable results with strong correlations between the two LSI's (Table 43).



Table 42. Kolb's Reliability of the 1985 LSI (n=268)

Learning Style Modes	Cronbach's Standardized Scale Alpha
Concrete Experience (CE)	.82
Reflective Observation (RO)	.73
Abstract Conceptualization (AC)	.83
Active Experimentation (AE)	.78
Abstract-Concrete (AC-CE)	.88
Active-Reflective (AE-RO)	.81

Table 43. Kolb's Correlations Between Current and Old LSI (n=268)

Learning Style Modes and Combination Scores	Split-half reliability 6 OLSI + 6 New Items (Spearman-Brown)	Correlation between OLSI and Total LSI 1975 <sup>a</sup>
Concrete Experience (CE)	.81	.89
Reflective Observation (RO)	.71	.87
Abstract Conceptualization (AC)	.84	.92
Active Experimentation (AE)	.83	.92
Abstract-Concrete (AC-CE)	.85	.92
Active-Reflective (AE-RO)	.82	.93

<sup>a</sup>All significant at  $p < .001$ .

Kolb (1985) claimed consistently negative correlations (Table 44) stating:

. . . intercorrelations among the raw scale scores follow the prediction of experiential learning theory -- i.e., strongest negative relationships between AC and CE, and AE and RO and no relation (statistical independence) between AC - CE and AE - RO (p. 6).

Table 44. Kolb's Pearson Correlation among LSI 1985 Scales (N=1,446)

Learning Style Modes and Combination Scores	CE	RO	AC	AE	AC-CE	AE-RO
Concrete Experience (CE)	1.00					
Reflective Observation (RO)	-.32	1.00				
Abstract Conceptualization (AC)	-.42	-.15	1.00			
Active Experimentation (AE)	-.22	-.33	-.30	1.00		
Abstract-Concrete (AC-CE)	-.85	.10	-.84	-.05	1.00	
Active-Reflective (AE-RO)	.05	-.80	-.10	.83	-.09	1.00